VETERINARY MEDICINE

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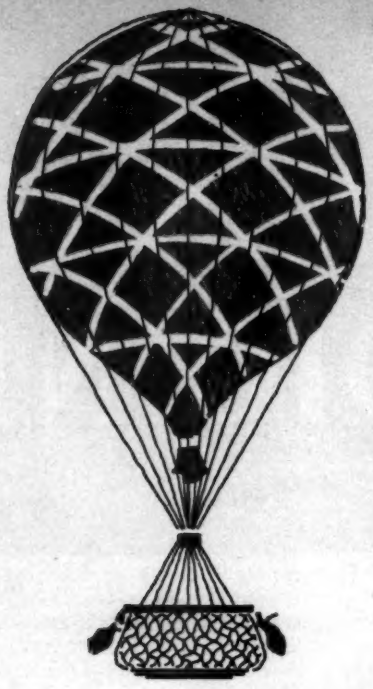

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Indiana Veterinary Medical Association—71st Annual Convention

ON the following pages of this issue of VETERINARY MEDICINE, is contained virtually all of the literary program of the 71st annual convention of the Indiana Veterinary Medical Association. Some of the discussions not published were of such nature that they did not lend themselves to reproduction. Motion picture films, some illustrated presentations, and others have not been included either because of their limitations for publication, they had been published earlier elsewhere, or because text material was not prepared and therefore was not available. What is included illustrates the high program standards of this association in accomplishing its objective by providing a rich and full three-day meeting devoted to consideration of diseases of livestock and pet animals of current interest.

Two panel discussion were scheduled—one of which (Symposium on Cattle Practice)* is reproduced as fully as consistent with approved procedure.

Well-planned entertainment features and the fellowship always evident at these meetings were for the enjoyment of those in attendance.

President Dr. E. R. Weisner, practitioner, Goshen, opened the meeting with a prepared address, excerpts from which have been included under separate head because of the thoughtful message contained. Doctor Weisner presided during the session and at its close was succeeded by Dr. Roe King, Sheridan, who was advanced from president-elect. Dr. J. E. Jordan, Indianapolis was elected as president-elect and Dr. R. W. Worley, South Bend, as vice-president. Dr. W. W. Garverick, Zionsville, who has served the association as secretary-treasurer for a number of years was succeeded by Dr. L. M. Borst, Indianapolis, newly elected.

Resolutions

Two resolutions passed the general assembly. The first concerned the Association's stand on the much-discussed matter of the establishment of a veterinary school at Purdue University. The Association took action recommending that no school be established but that funds which might be available for this purpose be expended for expanding facilities at crowded elementary schools and for strengthening disease control forces within the state. This action was deemed commendable.

President of the I.V.M.A.

Dr. Roe King

A second resolution, essentially a family matter, recommended furtherance of liaison between the Association and the Indiana State Livestock Sanitary Board. It was recommended that a list of qualified veterinarians be submitted to the governor from which he might appoint the veterinary members to the Board.

Membership

The secretary's report of membership revealed that at the beginning of sessions there were 358 active members, 262 of whom registered attendance at this meeting. Total registration was 351 which included out-of-state guests, exhibitors, et cetera. The applications of 38 new members were accepted, making a membership total of 396 at the close of the meeting.

Space limitation made necessary postponement of publication of two additional manuscripts presented at this meeting. These will appear in a subsequent issue.

*The editors wish to acknowledge the assistance of Moderator Dr. Ray C. Klussendorf, Terre Haute, in preparing this material for publication.

Excerpts From The President's Address†

E. S. WEISNER, D.V.M., Goshen, Indiana

HUMBLY I stand before you as your president. It has been a distinct honor to have had the privilege to serve you the past year. I will always cherish the confidence you have shown in electing me to the highest office to which I could aspire. It is my sincere hope that I have not proved to be only another "office holder."

Whatever I say to you today is not what I would have said yesterday and surely not what I would say tomorrow. A talk is always in a state of flux and I will spend much time in the future wondering why I did not say it differently.

Dr. E. S. Weisner

Nine years ago this morning Doctor Steenerson, in his address as president, advised that washing machines were no longer rationed and subtly suggested there was some dirty linen here and there. This morning I would amend to add that despite the ready access to automatic washers and an ever increasing array of detergents, some tattletale gray remains. Could it be possible that some few veterinarians, not now present, have been using "Fib" rather than "Fab"? The spreading of false rumors by one veterinarian about another is far too rampant. Occasionally, this is done innocently enough in making conversation with the farmer client, but each of us should make an effort to avoid falling into such traps. We should be especially careful in our conversation with clients who call us from points beyond our usual practice radius. Many of these men hold a grudge against their regular veterinarian and are happy to hear anything that he feels adds to his conviction that the grudge is justified. Thus are stories begun that can be disturbing to the one at which they are aimed.

During the years as an officer in this Association, I have spoken to a great number of people. I say spoken advisedly, because I am more inclined to listen than to talk. Many times I have been accused of being arrogant or surly when it has been only my innate, retiring nature that has been observed. I once resigned from a position which necessitated much speaking because I did not feel I had an inspired message. I have never fallen in love with my voice. Still I go along mutely enjoying others exercising their more vociferous tendencies in this respect. The pay-off has been that I have done more talking since I resigned than when I got a salary for it. But to continue, having listened to many people, I have attempted to incorporate their ideas into a president's address. Some of you will be able to identify yourselves brazenly plagiarized in this discourse. I do not apologize for having stolen your ideas but I do sincerely hope that the manner of my lazy aging and blending will make for an acceptable president's address.

Our Changing Times

I believe we have come to the end of an era. The end of the lone large animal practitioner. If you are observing as you thread your way over the landscape, meeting the emergencies for which you are called, you can not help but become aware of the inroads of others in our field. I would wager that there are few livestock owners, many you believe to be your regular clients, who do not have veterinary products in the barn cupboards, purchased at the mixing mill or through junk mail advertising. Unfortunately for us, if

†Presented at the 71st annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1955.

many of these products do not bring about the results the farmer expects, he explains it as not applicable to his situation. But, should we veterinarians dispense a product that falls slightly short of phenomenal, our reputation is sacrificed. It is not only interesting but frightening to look in the barn cupboard or on the sills and see some of the impossible products farmers are resorting to in an attempt to avoid the proper approach to management, sanitation, and rations for their stock. Of course infringements are not limited to our field alone. Recently, a new jewelry store moved into our town and the leaders with which they heralded their coming were wheelbarrows and lawnmowers. A recent full-page newspaper advertisement of one of our drug stores featured lawn furniture, garden hose, and men's socks. In our case, some veterinarians have contributed to this situation by not conducting themselves as they should. It does not add to the stature of a professional man, but can easily antagonize the farmer if a 12-year-old boy is sent to deliver a calf because some calf-puller literature said he could do it. When a carload of grammar school pupils are sent to vaccinate a flock of broilers, it does not add to the prestige of the veterinarian who sent them. Instances of this nature need not happen often before the farmer or poultry raiser begins to believe these operations must be simple and he can do them himself.

It is apparent that a quiet revolution is taking place. There are those who believe these encroachments to be indicative of a general depression, the equal of which can not be visualized. Each of us will have to make our own interpretation of these conditions. However, I am certain all of us will agree that the character of our routine practice is much below that for which we have been trained. If we continue to show our contempt for routine by continuing to send children to do our work, the practice left us will be still further below that which we are capable of doing and to which some of us aspire.

Some of us profess specialties in certain fields of veterinary medicine and may have located where we believed our specialty would be most beneficial to the livestock industry of that area. The success of such enterprises is apparently limited to our individual ability to "toot our own horn" or to associate ourselves with one or more of the agencies operating in the area. If we are prone to tie ourselves to some such group beause of their lack of ethics and/or their methods of merchandising, we soon find our specialty is a detriment to our livelihood. We find that to sit ethically and await call, we are by-passed almost completely and it is not until these pseudo-scientific groups have drained the livestock owners financially and completely confused themselves by their own overmedication that we are called on to straighten out the situation.

Speaking specifically, I have trouble-shooters for feed companies come to me after they have exhausted their, shall we say, repertoire, and ask me to help in salvaging a brood of 10,000 or more broilers. Often, in these instances, the original trouble can only be imagined and methods have to be employed to get the birds to show some semblance of chickens in their age class and go on from there. But, during this period, sometimes weeks in duration, these same trouble shooters have been casting disparaging remarks about my obsolete or "horse and buggy" approach to poultry disease control. The sole consolation in such instances is to remember, "It is the fruit bearing tree at which the sticks are thrown." However, few of the men helped from such predicaments of their own making become aware of their limitations and immediately return to their slap-happy merchandising of drugs, antibiotics, and souped-up feed.

Recently, I read that there are being released annually in excess of 4,200 different drugs, pharmaceuticals, antibiotics and the like to the field of medicine and nutrition. At least ten new products are released to animal feeding and livestock health agencies each week. Many of these products, with limited and, on occasion, falsified experimental backing are being poured into livestock and poultry. It is practically impossible for the lone veterinarian to keep abreast of such practices. Possibly, it would be more actual if I said he is even aware this is happening.

A month or six weeks ago, a biochemist spoke before our district group, Michiana. He likened the lone researcher in the field of biochemistry to be comparable to one reasonably good high school football player trying to compete against an entire team on the field. These teams of highly trained technicians are working constantly to break down and rearrange known chemicals. They are developing new compounds more rapidly than other teams in the same company can determine their value to public health, preventive medicine, or their use in livestock feeding or disease prevention and/or treatment.

Just how the lone veterinarian can compete with these innumerable agencies, I do not

know. These companies have the personnel to acquire the products from the original sources, adapt them to their use — good, bad, or indifferent — are also able to promote their sale through the large feed suppliers, to contact every cross-road mixing mill, and help sell the individual feeder known to each. Individually, it is impossible for us to compete against these teams who are slowly squeezing us out of our sphere of endeavor.

Congratulations to Small Animal Specialists

If one just casually reads professional bulletins and magazines, he can not but observe that there is a tendency for two or more veterinarians to form partnerships. Much more is accomplished by mergers of this nature than the mere thought — "Here are two men who like each other." By pooling their efforts, they can cut their individual costs of doing business. They can better afford to employ competent help to keep their books, answer the phone, and generally improve their business practices. Still further, each of the partners will be afforded time to do things other than meet the emergencies that arise in practice. Primarily, the partners can stagger their hours during which they are subject to call and thus bring some semblance of living into their own homes. Being men of enterprise, one or both is going to be inspired to broaden his field by instituting laboratory procedure to render additional service to his clientele.

It has been said by one in whom I have the greatest confidence that he believes that the cooperative effort of two or more veterinarians, or the presently established small animal hospitals using laboratory procedures, will be the means of bringing poultry practice into the field of veterinary medicine. I concur in this belief because surely we have not had a fair opportunity to show poultrymen how veterinary medicine, especially preventive medicine, can benefit them.

In speaking of small animal medicine, I marvel at the accomplishments these men have attained. The equipment and personnel and the things done in the small animal hospitals with which I am familiar truly make many phases of large animal practice appear crude indeed. We have progressed a great deal in the accomplishments obtained in large animal practice but not proportionately with the small animal practitioners. Each year we add to our regimen products and technics that benefit the livestock industry greatly and simultaneously simplify our work in the field, but I do not believe we can hope to reach a position comparable to that already attained by the small animal men.

I do not believe I am mistaken in saying that there is less stigma attributed to being a veterinarian on television, in moving pictures or on radio than was true several years ago. All of us, in our daily routine, our demeanor before our clients, the exercising of greater cleanliness, by paying attention to personal dress and the like, have made us more acceptable to the public rather than a necessary evil to be tolerated. It has been a reasonably long time since I have heard a veterinarian referred to as "a damn butcher."

However, some have contributed more than others to our being readily acceptable in polite society. Such an individual is a member of our Association who is known to many of you. Dr. William G. Magrane of Mishawaka spent last year at the University of Pennsylvania taking graduate work in opthalmology. During this time he attended lectures and laboratory classes with graduate doctors of human medicine. He held his own in acquiring the subject matter and was accepted by all with whom he was associated.

One of the principal challenges for our time to the individual is that he must not only achieve a fairly high degree of specialization to make him a useful member of society, but, at the same time, he must achieve enough general knowledge to enable him to look with sympathy and understanding on what is going on about him.

Controversial Question

Twice during the past several months I have heard the question, "Who is doing the thinking for the veterinarian?" On the spur of the moment there is a tendency to get angry and reply in kind. After the temper subsides and time heals the wound, maybe the questions were timely. I refer, primarily, to the chastisement given us by the president of Purdue University during the October short course. He referred undoubtedly to the brochure put out by our Legislative Committee. There are some who claim our Association was in error in coming out boldly opposed to the establishment of a veterinary school. I do not agree in this belief. Our first intimation of the demand for a veterinary college was well after the wheels were set in motion advocating it. Actually, I do not believe we had an alternative but to reply as we did. The Committee was delegated and empowered to ferret out the facts and their findings were to be the Association's stand regarding the need or

lack of need for a school. The brochure showed without a chance of doubt the need was lacking.

Incidentally, I want to commend the Committee for the splendid work they have done and thank them in behalf of the Association.

The brochure, like the Taft-Hartley Law, has not been completely read and interpreted. If you were in favor of the school, you poohpoohed the findings. If you were of the opposite mind, it offered irrevocable assurance someone was being sold a "pig in a poke." The brochure on initial or casual reading could possibly lead one to believe that the veterinarians of Indiana are a selfish group and strongly opposed to having their profession continued; that, possibly they desire to emulate the mule in regard to progeny.

Actually, I believe our state Association took an altruistic attitude in regard to establishing a veterinary college. Our attitude should have been interpreted that here was at least one group that was not asking for a dip in the public funds at the expense of other groups much more in need. Collectively, we knew that the present veterinary colleges were graduating enough young men and women to keep the number of veterinarians needed well in excess of places acceptable for practice.

The instances quoted by the agencies arguing for the establishment of a veterinary college of where it is impossible to secure the services of a veterinarian likely will always be deficient in veterinarians. No prospective practitioner in the field of veterinary medicine will locate voluntarily where the chances of making a living are lacking. Few veterinarians, indeed, would locate where they would not be assured of a reasonable demand for their services.

Possibly, from an educator's viewpoint, it would be opportune to establish a veterinary college in Indiana. Surely, it would add prestige to any institution to further advance agriculture in the state by having an accredited veterinary college on its campus. Maybe some of the presently established veterinary colleges will close during the next ten or 20 years, due to reasons not now known. If such a condition occurs, a veterinary college in Indiana, already established, would serve admirably.

From another point of view, it seemed that maybe those arguing for a veterinary college in Indiana were selfish not to consider the regional needs. I know that both of our neighbors, Michigan and Ohio, had been exporting veterinarians for a long time — that neither state could absorb the number they graduated.

Also, I did not know of any locations in Indiana where I conscientiously could advise a recent graduate to settle and your president receives requests of this nature. For instance, there are 18 large animal practitioners who serve Elkhart County and others are looking over our shoulders.

The more I thought about this problem, the more confused I became. It became a many-horned dilemma. How was one to know but that maybe the folks in Wisconsin, or possibly Louisiana, or maybe in North Dakota were planning the establishment of a veterinary college? To arrive at a logical conclusion, Doctor Worley, chairman of the Board of Directors, and I went to the A.V.M.A. office in Chicago to learn how the National Association felt about this situation. In doing this we had one regret. We had to go over the head of our district A.V.M.A. Executive Board member because of the nature of his employment. In Chicago, we learned that Louisiana had been contemplating establishing a veterinary college and had actually begun work on it but that the other southern and eastern states, through their area compact, had been able to stop further progress and the school will not be built.

In our own north central states area there is no compact and no authority to watch what the individual states are doing. Our request was referred to the Committee on Education, for consideration prior to the Seattle Convention. Their findings were reported, in turn, to the Executive Board during the convention. This board felt they should not make their findings regarding our question known, so apparently we are back to bickering again.

By now we should have shown we are not interested in getting our feet in the public trough. We have suggested that the money available would serve a better purpose if expended to relieve congestion in elementary schools and to attract more young people in Indiana to the teaching profession.

All we can do now is to await the decision of the Legislature and abide their desire. We have answered those advocating a school as honestly as we can. The data compiled by our committee is actual. History will either vindicate us or make monkeys out of us. I recommend that we all refrain from becoming involved in further debate on the subject. However, if a school should be established, let us do everything we can both collectively and individually to make and keep it a leader among the veterinary colleges of the country.

Swine Encephalitis†

H. C. SMITH,* D.V.M., Sioux City, Iowa

Encephalitides of animals, especially swine, are imperfectly understood. Correlations of symptoms and lesions have not been made, but observations and research of the author and others interested have added to information concerning pathology of a number of diseases that attack the nervous system. There is an even greater paucity of data on control and treatment. It is elementary to point out the frugality of any treatment in such cases as illustrated, considering extent of lesions. They are none-the-less valuable in pointing out that these occur under farm conditions in the Midwest.

TODAY, no other group of disease-producing agents occupy a more important place, have created more difficult questions, or developed more scientific attention and interest than have virus diseases. Our progress in properly identifying the many viruses that attack animals has been slow. It would appear that most scientific endeavors have been to develop chemotherapeutic agents which would destroy bacteria, leaving the viruses to gain a tremendous foothold.

When the amount of money that has been spent in the field of human medicine in the study of viruses affecting man is considered, it is realized that veterinarians have made progress in our own field. For example, poliomyelitis, cancer, pneumonia, and the common cold are human virus diseases which are still uncontrolled. Encephalitis in man has been attributed to a wide variety of causes. Why then, should swine encephalitis be considered as a distinct entity? It may be well to point out the fact that an organic disease affecting various organs of the body often manifests symptoms of brain disturbance. In spite of the fact that individual investigators have described rather sharply defined clinical entities under a variety of terms, appreciation of the variable manifestations of encephalitis warrants inclusion of the many causes under a single heading. This is based on certain features which they tend to have in common, both clinically and pathologically. Swine encephalitis may not always be a distinct entity, but on the basis of similar clinical pictures in a large number of cases, the disease appears to be one and the same. In fairness to all, the cause of symptoms may be a primary virus, or some bacteriotoxic material, or both. Just because an animal may manifest convulsive symptoms does not mean that it has encephalitis.

For the sake of simplicity, let us say that the most common cause of convulsions is a high fever associated with an infectious agent. A fit may occur at any time during the course of any condition, but usually takes place at the onset when the temperature is the highest, except in cases which are of a nutritional origin. Certain infections are more apt to be accompanied by convulsions than others.

For example, the most common conditions causing fits are the infections of the upper respiratory and the gastrointestinal tract such as those associated with streptococci, pneumococci, Influenzae, Salmonella and staphy-

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*Allied Laboratories.

lococci organisms. As a rule, bacteria, or their growth products, produce a meningitis, while the viruses produce usually an encephalititis, although the symptoms shown by affected animals are not distinguishable. The one exception to this rule is listeriosis infection. A diagnosis of encephalitis often is difficult and, at times, practically impossible. This is due in part to some irritative or destructive agents which, regardless of their characteristics, produce similar clinical pictures if and when they attack some parts of the brain.

There is always the possibility that a given neuropathogen may produce more than one type of symptom. Severe neurologic disorders have been encountered in exposed animals before or after vaccination for any disease. For example: Virus infections may persist in a host after signs of infection apparently have disappeared. It is not unreasonable to assume that re-exposure to the virus protein may precipitate a necrosis at the foci at which the original virus had become fixed. This may explain why nervous manifestations may occur in an animal long after the original vaccination. These usually are called postinfection encephalitis.

Fig. 1. Dissection to illustrate the ventral surface of the throat region. Note severe hemorrhage of lymphatic glands as solid masses of hemorrhage.

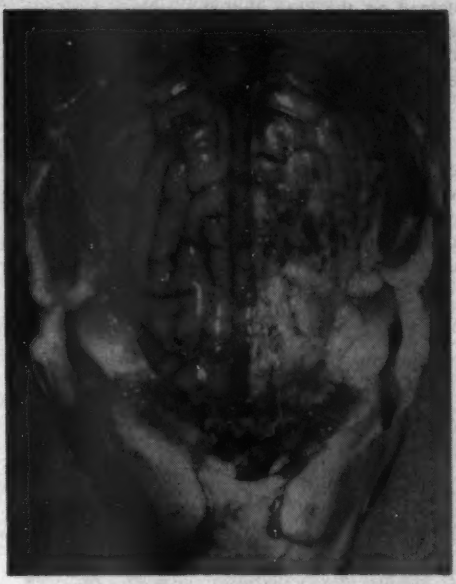

Fig. 2. Meningitis without involvement of brain tissue. Note hemorrhage of meninges (right) and absence of lesions on removal of brain covering.

The theory back of these occurrences is that the disease is caused by, or through, the action of the virus on the central nervous system, or by the activation of a latent virus already present. Thus far no one has shown that the direct action of a virus is the cause of post-vaccination encephalitis because the virus has not been isolated.

In such a discussion as this, perhaps we also should consider the allergic encephalitis because of the tremendous changes that are taking place in the feed industry. Some of you have observed herds of swine in which convulsions were the primary manifestation, indicating an encephalitis without elevation of temperature. Yet sudden deaths occurred. After removing the feed, or making a change in the feeding practices, no more symptoms or deaths occurred. Had such a condition occurred during or following immunization for any disease, an explanation might be rather difficult and the product used might be blamed for the deaths.

A possible explanation may be made on the basis of allergy because clinically allergic manifestations of the nervous system may be produced by the ingestion of food, injections of serum, vaccination against bacterial or virus diseases, or as complications of diseases. When such a condition occurs, it may be further ex-

plained on the basis that the antigen becomes concentrated in the central nervous system and subsequent injections of antigen reproduce the reaction.

Parasites

It appears to the writer, that during the past few years we have been seeing more and more swine herds infected with parasites. In too many instances, on posting pigs, many adult round worms have been found in the liver tubules and in other instances, complete occlusion of the gall bladder and bile duct. Some of these pigs thus infected had convulsions before they were posted. A possible explanation for these symptoms is based on the fact that when the liver is sufficiently damaged, various intestinal toxins are allowed to reach the systemic circulation and thus injure the brain. Since the toxins are disseminated through the blood stream, one would expect the brain lesions to be well distributed. This is exactly what happens. Just why such brain damage is not found in every case of severe liver disease is not known. Toxins that produce liver damage have not been identified.

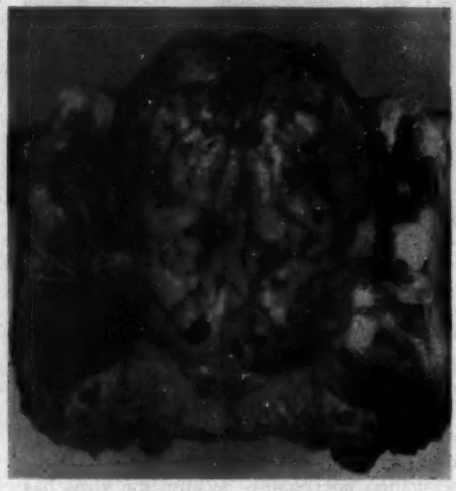

Fig. 3. Extensive and severe hemorrhage throughout the structure of the brain.

Conditions and Diseases Known to Cause Encephalitis

Phillips of Canada reports on dystrophic (atrophic) rhinitis as producing symptoms of encephalitis.

The infection appears to occur shortly after birth and symptoms are observed at two to four weeks of age. These commence with sneezing and are followed by wrinkling and some distortion of the snout. All cases do not show distortion. A high percentage of affected animals may show secondary pyogenic pneumonia due to *Brucella pyogenes*. Some pigs may die from septic meningitis. Others may walk with the head cocked to one side due to middle ear infection.

Japanese B Encephalitis in Swine

It was ascertained that a disease among swine with comparable symptomatology occurred during the great epidemic of B encephalitis in Japan in 1935. A simultaneous occurrence of epidemics in swine, horses, and man suggested the possibility of an interrelationship. Premature pigs in a given litter were observed. These manifested various stages of fetal development from mummification to normal. Some of them were weak and unable to stand. Central nervous system changes occurred in some instances. The histopathology was that of a nonpurulent encephalitis. There was a large amount of exudate in the pleural, pericardial, and abdominal cavities. Thoracic and mesenteric lymph glands were swollen. All serous membranes revealed petechial hemorrhages. The stomach contained yellow, stringy material. The animals manifested spastic and flaccid paralysis of the legs, high temperature and convulsions.

Newcastle Disease

Some veterinarians have had the idea that some swine suffering from encephalitis may be affected with Newcastle disease (ND). Hofstad has demonstrated that swine resisted rather large, intravenous injections of ND virus and that antibody response was slow and weak. Virus injected into the brains of eight pigs weighing 30 to 70 lb. each, produced death in from three to 11 days. The virus was recovered from the brains of five of the eight pigs; however, histological studies resulted in failure to find the characteristic lesions of Newcastle disease. This indicated that the virus did not spread any further than the original site of injection.

Teschen Disease or Porcine Poliomyelitis

Dalcek reports that encephalitis, an enzootic of swine, occurred in 1929 in Teschen (Czechoslovakia). It appeared as a new virus disease of swine similar to human poliomyelitis, producing paralysis in any part of the body. In 1949, 150,000 pigs died. The virus is restricted to the central nervous system, gastrointestinal tract, and its contents. It is found rarely in the blood, and for that reason cannot be trans-

mitted by hog cholera virus. The disease is specific for the pig, affecting all age groups. The period of incubation is 14 days. Some animals may exhibit paralysis for two to three days, while some may die in the same length of time. Some investigators believe that Teschen's disease is the final stages of swine influenza. It has not been recorded as existing in the United States. On the other hand, it has not been proved that this specific disease does not exist in this country at this time.

Experimental Swine Encephalitis

Experimental work has indicated that encephalitis may be reproduced in hog cholera-immune and nonimmune pigs by subdural injection of a virus. Isolation of the virus is difficult as the element of time is one of the most important factors. Thus far it has not been infectious to any of the common laboratory animals, which makes it impossible to be carried in series.

The period of incubation is rather short; death is rapid after the first symptoms. Lameness may be the only symptom in inoculated pigs. When lameness appears and the virus becomes localized, recovery may result. Further identification of this virus is necessary.

Leptospirosis (Swineherd's Disease)

This disease is widespread in hogs in the United States and has been the cause of an unusual type of mastitis in cattle. Its occurrence in swine in Israel, Italy, Switzerland, Russia, and Australia has been reported in the literature. The disease is due to *Leptospira pomona*. The *Journal of the American Medical Association* for February 18, 1949, reports on the disease in swine herds and also on five cases in man all of whom worked in pigsties. Serum of 42% of the pigs was positive against *L. pomona* antigen in 1:200 dilution. Persons who were not exposed to swine were negative.

Again in 1951, the *Journal of the American Medical Association* reports evidence of human infection with leptospirosis in the United States. Eye infections, particularly of the iris, may occur as late as three weeks to a year after initial infection. It is stated in this report that because of this long, symptom-free interval, the etiological role of leptospirosis may not be recognized. The symptoms in man are: Rise in temperature, loss of appetite, conjunctivitis, stiffness and "grippe." Symptoms are of a transient nature.

In Switzerland, the disease is an almost regularly occurring meningitis resembling epidemic poliomyelitis.

The bi-stagic fever curve shows a longer and higher first phase and a shorter second elevation. Fever lasts on an average of seven to ten days in mild cases. Some cases show jaundice, paralysis of the bladder, pleuritis, bronchitis and in severe cases, myocarditis.

The Disease in Swine

The disease, as it occurs in swine, may go unnoticed unless strict attention is paid to the herd. In some herds the symptoms may be an elevation of temperature, loss of appetite, disturbance of the intestines, manifested by diarrhea, and turning in circles until exhaustion. Rigidity and spasms of the body may occur. Jaundice may be present in 25% of the cases. Hemolytic anemia, conjunctivitis, and weakness of the hind quarters may precede convulsive state.

Swine Listeriosis

Listeriosis is caused by *Listeria monocytogenes*. It is somewhat difficult to isolate. Cultures instilled into the eye of a rabbit will produce conjunctivitis in six days. It is thought that swine may become infected through the eye. Listeriosis should be suspected if animals show cerebral disturbances and opacity of the cornea.

In 1926, some English workers described a disease in rabbits and guinea pigs. This disease was caused by a Gram-positive rod which produced a generalized infectious process associated with changes in the liver and an exudate in the body cavities. Neurological symptoms were not noted by the English.

The organism has been found in rodents, sheep, foxes, man, chickens, cattle, chinchillas, and swine.

The disease in cattle, sheep and swine is manifested by central nervous system disturbances. It also has been isolated from aborted fetuses.

In 1938, the Russians reported on isolating the organism from pox-like lesions in pigs and proposed the name *Listerella suis*.

DeBlieck and Jansen of Holland described an outbreak of listeriosis in a litter of nine pigs, from which four died at five days of age. They recovered the organism from the heart, lungs, liver, spleen, kidneys, and brain. The lesions were manifested by necrotic foci in the liver and spleen. Pleural and pericardial fluids also were present.

One of the early reports in the literature is by the North Dakota Experiment Station. Many veterinarians have suspected that ap-

Fig. 4. Multiple hemorrhage into cerebrum and cerebellum.

parently healthy animals may be carriers of Listeria and that under certain environmental conditions, organisms increase in pathogenicity and produce disease. Isolation of the organism from the livers of pigs, indicates that the organism may localize in the livers of swine without producing evidence of disease.

Biester and Schwarte of Iowa did considerable work with the disease in swine. The animals they injected, intracerebrally, with the organism died in 24 hours. Cultures were later recovered from the brains.

Graham of Illinois reports that the organism was found in cases of encephalitis and septicemic conditions and that it was found in pox-like lesions in baby pigs. Systemic lesions are shown by small necrotic foci in the liver and spleen, but when the animals manifest symptoms of encephalitis, there are usually no lesions found in the viscera.

Rhoades and Sutherland report on a case of concurrent infection with hog cholera and *Listeria monocytogenes* in a four-month-old pig. The organism was isolated in pure culture from the liver, spleen, and kidney, but was regarded as secondary to the hog cholera infection. No symptoms of encephalitis were noted. In this particular case, the farmer vaccinated 125 head of three-month-old pigs. They sickened 14 days after vaccination; 18 died of what appeared to be hog cholera.

Symptoms of Listeria Infection

Incoordination and inability to stand alone, trembling, increased respiration, movements of the jaws and neck as if attempting to grasp something are characteristic symptoms observed. Pigs weighing 40 to 150 lb. exhibited incoordination or dragged their hind legs. The front-leg action is characterized by an accentuated, stilted gait. Nervousness and excitement are common. Trembling but not shivering may be observed.

Diagnosis can not be made from clinical or postmortem lesions because too often gross lesions are not found. Therefore, a laboratory examination is necessary to make a positive diagnosis.

Antibiotics and Sulfonamides May Produce Encephalitis

When penicillin breaks down in the body, a penicillamine is formed. In formula it resembles several of the essential amino acids, but added to the diet of rats it may result in the development of a dietary deficiency syndrome. The animals develop running fits, convulsions, and eventually die.

It has been suggested that penicillamine acts like aminopterin, in that it displaces essential food elements in the body reactions. This antigenistic action is believed to displace folic acid in animal nutrition and folic acid deficiency symptoms (such as diarrhea) may be induced by feeding aminopterin even in the presence of an abundance of folic acid. Similarly, the sulfonamide drugs may produce a deficiency of the B complex vitamins if administered over a long period. In addition, sulfonamides when given orally, remove by adsorption, the gastric and intestinal enzymes which are needed for proper assimilation of food.

Changes in Rations

The processing of grains and grasses intended for animals involves some alteration of essential nutrients. Fortunately the animal body provides a tremendous leeway of protective and adaptive mechanism so that it may continue to grow and develop.

The addition of antibiotics and sulfonamides to feeds has gained in popularity because of the A.P.F. or growth promoting factor found in residues of antibiotics. These facts offer a further reason for discriminating use of antibiotics and sulfonamides.

Veterinarians should recommend a ration rich in natural proteins, of high biological value, follow modern antibacterial therapy, and replenish short stores of amino acids and B complex vitamins that may be destroyed or lost through medicinal agents.

For many years, the emphasis in food production has been on higher yields. The introduction of hybrid varieties of cereals has resulted in increased production per acre. Within recent years feeding experiments have indicated that there is considerable variation in some of the quality factors, such as vitamins, among the different hybrids of any one cereal grain. A recent report by Hunt, *et al.*, revealed that the niacin content of corn is less subject to modification by environmental conditions than is pantothenic acid.

Carroll and Peng recently have presented data with respect to the niacin and pantothenic acid content of several varieties of each of four different cereals; namely, corn, wheat, oats, and soybeans, grown under the same environmental conditions. The results illustrate that there is wide variation among the four cereals studied with respect to the niacin and pantothenic acid content, the difference being greater with niacin than with pantothenic acid. Among the varieties within the species, the niacin content had a wider variation in the case of corn, oats, and soybeans, but little in the case of wheat. Soybean was the only cereal that had any marked variation of pantothenic acid. Today's rations for swine contain large amounts of soybean meal.

Fig. 5. Hemorrhagic lesions on, and within, a portion of the brain—cerebellum.

Now the practical application of this information is that during the past few years larger numbers of pigs have been observed exhibiting symptoms of goose stepping, convulsions, and fits as compared with previous years. Kernkamp of Minnesota has indicated that pantothenic acid deficiency may be produced within a period of 35 days by feeding a diet void of this vitamin. The symptoms observed were jerking of the legs; almost like a military goose step. A lack of coordination may appear to be a lifting of one leg off the ground suddenly. Convulsions were produced in 130 days. Almost all animals developed a subacute colitis. He concluded that perhaps pigs did not utilize food due to the intestinal flora having been destroyed. He suggested the addition of barley and liver meal to the diet.

The 1946 report of the Chief of BAI revealed that locomotive incoordination in swine may be produced by heating a normal diet. Correction of the symptoms could be afforded by adding 250 mg. of:

Calcium pentothenate to each 100 lb. of feed.

Molasses solubles in 3% levels.
Peanut oil meal at 12% of the ration.
Liver meal at 4% of the ration.

Encephalitis in General

In the encephalitis arising during a primary viral attack, the virus causing the initial infection still may be active and detectable, while the encephalitic process continues. Whereas in the postinfection group, the primary virus is, as a rule, no longer recoverable and the primary syndrome has disappeared or is dropping rapidly into the background. Finally, the basic pathologic pictures of the former are those caused by the direct action of the virus, while in post infection encephalitides, the pathologic picture is entirely different.

Severe injury of the brain (encephalitis) and spinal cord has been observed as an immediate or early sequel of many immunization procedures including the inoculation of living vaccines, killed bacterial suspensions, or other culture materials and prophylactic antisera. The results of such injuries are often so devastating that the possibility of their occurrence should be realized generally. The pathogenesis of this encephalitis has been the subject of much

(*Continued on page 286*)

Questions Concerning Drug Actions In Veterinary Practice†

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THE following questions were submitted by veterinarians as the basis for a discussion of every day clinical problems. The answers are offered in the spirit of suggesting lines of thinking, rather than the final word, which is not their intention in any sense. In framing the answers the writer is indebted to far too many sources to give proper credit.

1. *Why do animals vary so much in their reaction to intravenous anesthetics, particularly dogs to pentobarbital?*

So many animals react reasonably consistently to the "standard dose" of pentobarbital that veterinarians become accustomed to consistent reactions and may not be prepared for the ccasional "atypical" reaction. When the standard dose proves insufficient to anesthetize the dog, he gives more. On the other hand, when the same dose proves overwhelming, he may be obliged to resort to analeptics (*e.g.* amphetamine) to save the patient. How can this danger be averted?

The best way is to dose "to effect". Assuming the suggested anesthetic dose to be 4 cc. for a 20 lb. dog, inject 2 cc. first, then allow a couple of minutes before injecting more. Then inject the remainder very slowly, stopping as soon as the depth of depression approaches that of surgical anethesia. Sometimes it will take 5 cc., occasionally 3 cc., but most will be properly anesthetized with approximately 4 cc. Slow injection to effect, is the way to obtain good anesthesia and avoid fatalities.

It is not always apparent why animals vary in their sensitivity to anesthetics. Naturally, pathologic changes are expected to affect this reaction, such as shock, loss of blood, heart disease, fever, toxemia, and any condition causing either central nervous disturbance or circulatory embarrassment. Nephritis is a frequent cause of exaggerated sensitivity, because barbiturates are excreted by the kidney, and kidney damage retards their removal from the blood.

Variations in anesthetic response occur also in animals that are apparently normal. This is recognized in humans, and all intravenous dosing by physicians is done by slow injection, to effect. Veterinarians should be equally conscious of this variation among their subjects, regardless of what anesthetic is being injected.

Another important point to remember to avoid losses from anesthesia is to keep animals warm. The anesthetized animal, in a cool room, loses heat faster than generated. This soon can lead to a state of circulatory embarrassment and death which could have been avoided by applying a hot water bottle or heat lamp to the body.

To demonstrate the importance of heat, Dr. George R. Burch* anesthetized two normal dogs with the same dose of pentobarbital. One of them was placed in a cage with an air temperature of 65 F. This dog became deeper and deeper depressed, and died about 19 hours later. The other dog was placed in a similar cage, but with a heat lamp. This animal was moving about within 2½ hours and was up on his feet seven hours after the injection. Heat made the difference between success and failure.

2. *Are two 500 cc. bottles of 50% dextrose better than one when treating a cow with acetonemia?*

Speaking from personal experience, I am inclined to doubt it. I have injected ten bottles over a period of a couple of hours, only to see the cow respond no better than to one bottle. This may not be a fair comparison, but I believe frequent administrations are more important than large amounts at one time. My experience has been that a cow that will not respond to a single bottle of dextrose, by showing improved appetite and brighter look, usually will not respond to several bottles, and the cause must be sought elsewhere than in hypoglycemia.

†Presented at the 71st annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1955.

*Director, Pitman-Moore Co., Research Farm.

When a cow does respond to dextrose, it is important to sustain her sugar level. This may be done with daily injections of dextrose, or by oral administrations of glycerin, propylene glycol, sodium propionate, or some other effective glycogenic agent. Table sugar and dextrose are not satisfactory for oral administration. For complete and permanent recovery from ketosis it is important to maintain the cow's appetite, either by making repeated injections of dextrose, or suitable oral supplements. Each time the cow is permitted to relapse, she will be that much more difficult to cure.

3. *Does epinephrine cause toxic reactions in animals?*

While there is always the chance of epinephrine causing cardiac arrhythmia and excessively high blood pressure, these dangers seem to be of minor importance in animals, as compared to man. Recently, however, we have been hearing of severe toxic reactions following subcutaneous and intramuscular injections of epinephrine, particularly in dogs. To study this, Doctor Burch injected 0.5 cc. of a 1:1000 solution of epinephrine hydrochloride into 20 normal dogs; 14 intramuscularly and six subcutaneously. Most of them soon developed edema at the site of injection. This led to necrosis after five of the intramuscular injections and three of the subcutaneous. A pregnant female aborted. He advises diluting epinephrine to 1:10,000 before injecting it.

4. *What are the advantages in the various methods of worming sheep with phenothiazine, comparing liquid suspensions, tablets, and salt mixtures?*

Suspensions and tablets of phenothiazine are employed primarily to remove worms from heavily infected sheep. Apparently it makes little difference which form is given, although suspensions reach the abomasum and intestine sooner and in greater concentration than the tablets. All evidence indicates, however, that the continuous administration of phenothiazine, mixed with salt (1:12) and kept available "free choice", is the best method by far from the standpoint of raising lambs relatively free from parasites. It is always more profitable to keep the parasites out of sheep than wait to treat them when they become heavily loaded.

5. *How can kidney disease be diagnosed readily in a dog?*

Dogs are prone to kidney disease. In fact, nephritis is so common among dogs, particularly dogs past middle age, that the veterinarian is wise to look for it routinely. In these older dogs, chronic nephritis is most common, characterized first by incapacity to concentrate urine (polyuria) and later by accumulation in the body of waste materials (uremia).

The outstanding symptom of the first stage is an abnormally large volume of a pale, dilute urine. The dog drinks water constantly, and naturally urinates copiously. Kidneys are attempting to flush out the waste products which they no longer are able to concentrate. A question to the owner as to how much the dog urinates should determine whether there is serious kidney damage. In case of doubt, collect a specimen of urine and examine it for specific quantity. If it is less than 1.010 on three repeated tests, at intervals of several hours or on different days, a positive diagnosis usually is justified.

Kidney disease is progressive, so this polyuric stage is succeeded by the second stage; that of nitrogen retention. This is characterized by intermittent periods of acute uremia, followed by more or less normal periods. During the normal periods, the dog eats more protein than his damaged kidneys can eliminate, so waste nitrogen accumulates in the body until it can be tolerated no longer. Then the dog goes off feed, vomits profusely, has frequent loose stools, and eventually gets rid of enough nitrogen this way to feel good again. During this period the patient exhibits the characteristic picture of uremia, congested eyes, ulcerated mouth, and urinous breath. The owner thinks he is about to die, and no treatment seems to help during the earlier part of this period.

As the nitrogen level declines, the dog rallies, and any treatment applied at this time gets credit for saving the dog. Obviously this is absurd. Most cases, however, go through several such cycles, with shorter and shorter normal periods, until the kidneys become completely incapacitated and death overtakes during the final uremic bout. Not much can be done to save these cases, although special diets to eliminate nonessential proteins may soften the severity of the uremic periods and defer the inevitable end by a few weeks. Peritoneal lavage with 5% dextrose sometimes helps to alleviate the uremic symptoms. But it is important for the veterinarian to recognize these cases when they come to him, and distinguish them from food poisoning, infectious hepatitis, leptospirosis, et cetera.

6. *What is the best way to administer ruminatoric tablets which contain tartar emetic and barium chloride?*

Since rumination follows stimulation of the nerve center in the medulla by stimuli that originate in the mucosa of the abomasum, ruminatoric drugs that stimulate reflex action should be administered to reach the abomasum as quickly as possible. In the case of a cow with a rumen that is completely inactive, the tablets should be dissolved in water (or rather broken up, for they are not completely soluble) and given as a drench. The act of drenching causes closure of the esophageal groove and directs most of the drench into the abomasum where the drugs can "tickle" the mucosa and elicit the rumination reflex. On the other hand, unbroken tablets shot from a balling gun go into the rumen, where they must await breakdown and passage into the abomasum in order to stimulate reflex.

In cases where rumination is weak, but still functioning, the administration of whole tablets may be justified, although debatable. Even here it would seem they should be given as a drench. Likewise, when a rumen with complete atony is first stimulated by injecting a drug that works on the nerve endings in the rumen (*e.g.* neostigmine, eserine), this action, which is transient, should be prolonged by drenching at intervals with the reflex-acting ruminatoric tablets.

In all these cases, bear in mind the importance of plenty of water in the rumen. Pump it in through a tube, and direct the owner to give several quarts of water after each dose of tablets. Also, remember that pain is the great antagonist to rumination, particularly abdominal pain, such as is caused by a nail in the reticulum. Unless the cause of pain can be removed, no ruminatoric can prove effective.

7. *Do you recommend a heart stimulant along with an intravenous injection of calcium to a cow with milk fever?*

No; it should be given previous to the calcium injection. Calcium itself is a heart stimulant and the cause of acute death during treatment is excessive stimulation from the injected calcium accumulating in the weakly beating heart. The purpose of the stimulant is to start the heart beating more vigorously *before* the calcium reaches it. Give the stimulant before you begin to warm the bottle of calcium, and by the time you are ready to inject it, the heart should be beating vigorously enough to handle the calcium.

8. *Which antibiotics can be used in combination, and which cannot?*

When two antibiotics are used therapeutically in combination, each of which when used alone is lethal to a particular bacterial species, their combined effect may be: (1) The sum of their individual actions (additive); (2) greater than the sum of their individual actions (synergistic); or (3) less than that sum (antagonistic.) This principle applies to antibiotics and similar agents (sulfonamides, disinfectants) only when they act on the same organism and in the same location in the body. It has no application to combinations that are directed toward different pathogens, nor those in which one agent is intended to work, let us say, locally in the intestine while the other is absorbed to function systemically. A good example of antibiotics working together on the same pathogens is that of the intramammary combinations used in mastitis.

Extensive studies, largely *in vitro*, indicate that the common antibiotics may be classified according to how they work together in groups. Penicillin, streptomycin, neomycin, bacitracin and polymyxin (and probably tyrothricin) work together, and are either additive or synergistic in most combinations and against most bacteria. This is called group I. In general, they are all antagonistic to group II, represented by aureomycin®[1], terramycin®[2], chloromycetin®[3], erythromycin, and carbomycin. These latter, however, are synergistic with each other.

It should be stressed that these conclusions have been drawn largely from studies in test tubes, which do not always hold true in the animal. Thus they should be regarded more in the light of general characteristics of the antibiotics, rather than specific indications that must be followed to the letter in every case. When a choice is possible, and there is no clinical indication to the contrary, it is well to follow the rule of combining antibiotics of the same group, rather than cross over and mix them. On the other hand, there are reports to indicate that some mixed combinations work very well in certain clinical conditions, and this is still the soundest basis of all for selecting a drug combination.

9. *How long does a dose of calcium gluconate (500 cc.) remain effective in a cow after treating a case of milk fever?*

This varies widely, but in most cases the effects last from four to 24 hours. Nor does it last appreciably longer when execssively high doses are injected, for larger doses are re-

(*Continued on page 286*)

®[1]Lederle Laboratories Division, Pearl River, N.Y.
®[2]Chas. Pfizer & Co., Brooklyn, N.Y.
®[3]Parke-Davis & Co., Detroit, Mich.

Some Considerations of Practical Bovine Surgery

G. H. CONNER*, B.S., D.V.M., M.S., East Lansing, Michigan

Amputation of the Claw

INDICATIONS for amputation of the digit or a portion of it include: Fracture of the second or third phalanx, bone damage resulting from puncture wounds, and most commonly, because of advanced, infectious conditions due to entrance of *Actinomyces necrophorus* through abrasions in the interdigital space or at the bulb of the heel that has progressed to subcoronary phlegmon, septic arthritis, or necrosis of parts, including tendinous structures.

Fig. 1. Claw amputation. Obstetric wire saw in place. Note direction of incision. Heavy tourniquet in position.

Our technic (fig. 1) is simple and requires only a few minutes to complete. The animal is cast and the foot scrubbed and cleaned carefully. Anesthesia is induced by block of the medial and lateral digital nerves four inches below the tarsus or carpus as they traverse along the flexor tendons. When this has been accomplished, we infiltrate a suitable local anesthetic agent completely around the front of the leg to reach the branches of the dorsal digital nerves.

A tourniquet is applied in the middle area of the metacarpal or metatarsal bone. An ordinary wire saw is then positioned between the claws and directed so that amputation through the first phalanx is outward and upward, leaving a slanting, cut edge. Care is exercised to avoid thermal necrosis either by playing a stream of sterile saline on the blade of the saw, or thoroughly wet cotton may be employed to keep the saw blade cool.

Resulting stump (fig. 2) needs no skin flap. Healing is satisfactory and prompt under suitable dressing. Sulfanilamide or antibiotic surgical dressing powder may be used under a sterile pack, plenty of cotton, and a tight bandage. Release tourniquet during bandaging then reapply while completing the dressing. No ligatures are required if care is used in dressing. Unless complications develop, bandage is left in place for ten days to two weeks (fig. 3). No further treatment other than that given an ordinary open wound is needed. Liquid plastic spray such as aeroderm®[1] may be used after the pressure dressings have been removed. It is recommended that animals be kept in a well bedded, dry stall or in other clean, dry paddocks or pasture during healing. The plastic bandage will stay in place under

Fig. 2. Claw removed. Note absence of hemorrhage.

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*Large Animal Clinic, Department of Surgery and Medicine, School of Veterinary Medicine, Michigan State College.

®[1]Aeroplast Corp., Dayton, Ohio.

Fig. 3. Ten days postoperative. Animal is bearing full weight on the leg and healing is progressing satisfactorily. Plastic dressing protects surface.

favorable conditions for approximately seven days, at which time wounds need little or no further care. It is surprising how well animals get along with one claw and, except for slowing the walk over rough terrain, surgical patients appear to suffer little or no impediment.

Prolapse of the Vagina

Chronic prolapse of the vagina occurs commonly in beef cows and is prevalent among dairy cattle. Protrusion of even minute areas of the vaginal wall become contaminated, setting the stage for various degrees of vaginitis. As this process continues, straining results in greater protrusion and more extensive involvement.

Fig. 4. Surgical closure of upper portion of the vulva two weeks postoperative. Only the lower 1/3 of the vulva remains open.

Presurgical preparation is restricted to confinement of the patient, cleansing, and infiltration of 2% procaine solution along the upper margins of the vulva in addition to a moderate amount of epidural anesthetic. Surgery involves trimming a thin strip (approximately ¼ in.) off the lips of the vulva on either side, beginning approximately ⅓ distance dorsal to the ventral commissure and working upward to the dorsal commissure. This technic is a modification of the Caslick operation described for mares (see fig. 4).

Continuous vertical mattress sutures of stainless steel are placed to bring the cut edges into apposition. Draw loosely to avoid tearing. Wire is preferred as suture material because of minimum tissue reaction and its noncapillary properties. After completion of surgical closure, we apply two or three coats of aeroderm plastic dressing, allowing a few seconds for drying between coats. It is water repellent and flexible, minimizing fecal contamination durin the healing process.

Fig. 5. Teat surgery. Incising the teat wall to gain entrance to canal. Note spring-bladed forceps at right applied to base of teat over gauze.

Sutures are removed in seven to ten days and healing usually is complete in approximately three weeks.

Teat Surgery

Invasion of the teat canal requires careful preparation and the best possible asepsis. We always use sterile equipment, drapes, and sterile gloves.

Anesthesia is induced by infiltration completely around the base of the teat with 2% procaine solution. The agent is injected superficially then deeply so as to deposit material into the mucous membrane lining the canal.

The first step in the surgical technic is the application of a spring bladed forceps (fig. 5) at the base of the teat over a strip of gauze. The purpose of these is two-fold; to effect hemostasia and also to prevent milk (in lactating cows) from clouding operative site. Incise generously to expose the canal lining from the spring forceps downward. In the event obstructions such as fibrous growth are to be removed, adequate exposure is essential for good surgical results (fig. 6). In some instances, the wall, tumor, or lesion can be inverted and exposed through the incision to allow removal and repair of the mucous membrane through it.

Teat wall is closed with no. 34 stainless steel wire. Small, simple, mattress sutures are placed through the wall to bring all layers in normal apposition. Metal clips then are placed over the incision and the wound covered with aeroderm dressing. Plastic dressing is also placed around the flange of the teat cannula, sealing it in place. The plastic will withstand washing and manipulation of milking for a few days. Additional plastic dressing may be applied as needed.

Fig. 6. Exposure of the teat canal lining. Forceps in the center are applied to a fibrous growth to be removed.

Fig. 7. Seven days after surgery. Suture and wound clips removed.

Sutures are removed in approximately six or seven days (see fig. 7). Teat cannula is left in place, without a cap for two or three days, then removed. Ordinarily hand or machine milking is possible three or four days after surgery.

Summary

Improvements in anesthesia, surgical technics, and dressing procedures now make possible superior results of surgery considered hazardous only a few years ago. Certain precautions regarding asepsis must be taken to assure successful results.

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Scrapie in Sheep

Dr. Leo Cahalan, Logansport, Ind., was called to examine a swelling on the ear of a three-year-old Suffolk ram in a mixed flock of 53 sheep. The swelling proved to be a hematoma. Observing the ram, Doctor Cahalan noted evidence of severe pruritus—the animal had much of the wool on the sides rubbed off. It also was noted that the ram appeared restless, getting up and lying down frequently, and striking the sides and belly with the hind feet or leaning against some fixed object and rubbing vigorously. Tentative diagnosis—scrapie.

The ram was observed ten days later and again after seven days. Progressive emaciation and impairment of locomotion developed during this period. Laboratory studies confirmed the tentative diagnosis. The remainder of the flock was condemned and slaughtered. No new cases have been observed in the area.

▼ ▼ ▼

When confronted with a bovine patient down in the lot or pasture, one must differentiate from a large group of disease conditions including: Fractures and dislocations, postpartum obturator paralysis, arthritis, lymphocytoma, septic metritis (with or without retained placentae), toxic indigestion, ketosis, pylonephritis, magnesium deficiency (grass tetany), gastroenteritis, pneumonia, uterine rupture, mastitis (toxic type), nutritional deficiency, and anemia.—*Roy W. Westcott, D.V.M.*

Service to the Poultryman†

J. L. BOYDSTON, Wauseon, Ohio

ECONOMICS limit the exercise of veterinary medicine. If the services we perform can not be rendered at a rate that allows users to gain from our employment, then we are useless. This must be kept in mind constantly in poultry practice for profit margins are narrow and volume is the keynote. Almost every poultry enterprise involves a greater economic investment than other farm enterprises.

Finished broilers represent a cash outlay for production cost of about $100., laying hens about $150., and turkeys about $1,000. per 100 birds, so it may be seen that even small enterprises require large investment outlays.

To observe one individual or even two or three and make a diagnosis from your office, unless the ailment is absolutely unmistakable, is a disservice to your client. To make a professional call and prescribe needed treatment plus recommendation of improved husbandry practices is a valuable service.

Prophylactic or preventive medicine so-called, those measures which keep your client from having trouble, are the ones that make him a profit. Therapeutic measures often add up to the salvage of an investment and not a profit.

If you intend to build a poultry practice, let me suggest that you attend all available poultry clinics and meetings, both professional and lay. You thus learn and establish contacts at the same time.

Leads and contacts of an ethical nature are musts in this as in all enterprises. In routine farm calls, compliment your clients on their poultry, inquire of their health, and lead them with questions.

Accurate diagnosis is the next step. Basically, our training in anatomy, histology, physiology, pathology, therapeutics, and medicine places us in the most enviable position of authority. If these "expert" laymen can acquire anything at all in one- to six-day courses, we surely can do much better and in less time. Poultry respond to care and treatment much like mammals. To make an accurate diagnosis, observe the flock and its surroundings as often as possible and always do autopsies (that is plural, if you will note), preferably on specimens you select. Supplement this with necessary laboratory facilities — your own and/or state operated.

Treatment is the next step and probably the end, by which the means are obtained. *It must be efficient and economical.* Of necessity it must be suited to the species. Foul odors or tastes are despised by all poultry. Turkeys are suspicious of color changes. Chickens with breathing difficulties can not consume enough dry mash to maintain body weight. Individual treatment is not practical if means of mass treatment are feasible. Ventilation is of utmost importance as most moisture from fowls is exchanged in the process of breathing and dryness of their quarters is necessary.

Poultry Diseases

Respiratory diseases are probably the most costly to the poultry industry and the most resistant to treatment. Infectious bronchitis, Newcastle disease, coryza, and chronic respiratory disease (CRD) are the most common and confusing at the present. All seem to start in much the same manner, with birds coughing and sneezing and exhibiting evidence of impaired respiration. Infectious bronchitis seldom kills except in very young chicks, but is often followed by CRD which may be a severe killer. Hens in production seldom go below 10% in production, but are affected generally by lowered production and/or poor quality eggs permanently. Newcastle disease starts much the same, but the respiratory phase generally is followed by a severe greenish diarrhea and a complete cessation of laying. Heavy death losses due to Newcastle disease have occurred during the past two years. Nervous symptoms also follow the respiratory phase and may affect only a few birds, or many. Crooked necks and lameness are the most common symptoms. Poor quality eggs and lowered production last about 60 days usually with a return to full, normal production.

Coryza should be classed as the common cold and varies much more than the others,

†Presented at the 71st annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1955.

depending on housing conditions. Discharge from nostrils and swollen, caseated eyes are characteristic of this disease, more commonly called "roup". Pox may be confused easily with coryza when pox causes the eyelids to adhere to each other or when it becomes diphtheritic and closes the larynx. Diphtheritic pox also causes heavy death losses.

Chronic respiratory disease often follows other respiratory diseases, or it may be a separate entity. Bubbly breathing, with or without loss of appetite, is the main evidence.

Postmortem examinations in the case of respiratory diseases leave much to be desired. I am unable to differentiate between Newcastle disease and bronchitis. Pox may be observed externally on comb and wattles, and if a pus plug is found in the larynx and birds are dying of suffocation, guard your prognosis. In coryza, most evidence is found in caseated pus in eyes, and a tenacious mucus in the nostrils.

In chronic respiratory disease, we find pericarditis, peritonitis, and pus in the air sacs, with varying degrees of pneumonia. Heavy breeds seem much more susceptible than lighter breeds and housed birds more than birds on range.

Treatment of Respiratory Diseases

Bronchitis. Use no sulfonamides. Offer wet mashes several times daily. Use tasteless guiacol compound in water (1 lb. to 1 gal. stock solution), 1 oz. per gallon and 1 oz. per 100 birds in the wet mashes. Use heavy vitamin medication, with hematinics and general good nursing. Provide for an abundance of fresh air (open range where feasible).

Vaccines and viruses are available for immunizing birds up to laying age. In our experience, live virus injected at eight to 16 weeks of age has been the only satisfactory immunization for layers.

Newcastle Disease. Treatment is about the same as for bronchitis with emphasis on moist mashes to keep birds eating. Do not use sulfonamides. Immunization at all ages may be practiced with various types of viruses. Particularly different here is the fact that killed, injectable vaccines often will protect birds housed even adjacent to those showing symptoms and is an advisable practice.

Coryza. Again good nursing, as used before, with sodium sulfathiazole (1 lb. per gallon stock solution), 1 oz. per gallon of drinking water for five days. Birds also may be sprayed using guiacol (commercial solution, not tasteless) and liquor cresolis: 8 oz. of each in one gallon of kerosene. There is no successful form of immunization.

Pox. Symptomatic treatment and nursing as outlined in the foregoing. Vaccination always is recommended at from 10 to 20 weeks of age and immunity is reliable.

Chronic Respiratory Disease. Nothing is perfect every time. Terramycin®[1] in feed (100 to 200 gm. per ton is recommended). Use for at least five days and up to ten days. Terramycin in oil is the best for injection, but too expensive to use on broilers. It might be all right on some other cases. Penicillin and streptomycin give good results for 24 to 72 hours and not much longer, but will sometimes give a flock enough boost to get on feed again. If the flock is off feed, moisten cracked corn with cod liver oil and feed several times a day. Also, supply milk in some suitable form and moisten feed with water until crumbly.

Coccidiosis. Perhaps ranks next to respiratory diseases in importance. Damage to the health of the flock, presently and throughout life may be great. There are approximately 16 species affecting chickens and three or four species affecting turkeys. However, only three appear severe in chickens and about two species produce significant disease in turkeys.

In chickens, cecal or bloody coccidiosis caused by *Eimeria tenella* occurs chiefly at six to eight weeks of age. Sudden death with severe paling around the head and legs are often the first signs of infection noted. Postmortem reveals hemorrhage in the ceca. Severely affected birds that recover are often stunted permanently. Treatment consists of good nursing procedures and sulfaquinoxyline solution (3.44%), 1 oz. per gallon of water for three days, then a good hematinic for two days and repeat this procedure as needed.

Intestinal Coccidiosis, Acute (Bloody). Caused by *Eimeria necatrix*, this infection occurs generally at six to 14 weeks of age. Birds are observed to be droopy, feathers ruffled, and losses become severe after a few days. Postmortem examination reveal severe inflammation of the intestines, often with free blood. Treatment recommended is good nursing and management. Sulfaquinoxyline solution (3.44%), 1½ oz. per gallon of drinking water for three days, a good hematinic two days, then 1 oz. of sulfaquinoxyline per gallon for three days, two days on a hematinic and repeat lowered dosage as needed.

®[1]Chas. Pfizer & Co., Brooklyn, N. Y.

Intestinal Coccidiosis (Chronic). Caused by *Eimeria acervulina,* chronic coccidiosis usually occurs after eight weeks of age and may occur in layers that are not immune to it. Stunting, lowered egg production, and general unthriftiness are the usual signs. Postmortem reveals a low grade inflammation of the bowels with characteristic colonization showing on the serous surface of the bowels. Use sulfa vet[®][3], 1 lb. per 200 lb. feed for three to five days with tonics and hematinics.

Microscopic examination is essential for positive establishment of diagnosis of all coccidiosis.

Coccidiosis of turkeys has not been a great problem and sulfaquinoxyline solution (3.44%), 1 oz. per gallon of drinking water for five days generally suffices.

Beware of Blackhead. To post one bird from a flock of young chickens and find evidence, then make a diagnosis of blackhead is a grave error. Too often blackhead and coccidiosis occur in the flock concurrently. If you find both, let me suggest that you treat the coccidiosis first.

Birds with blackhead appear much like birds with coccidiosis; however in blackhead we look for those characteristic lesions of the liver and ceca in both chickens and turkeys. I need not tell you that in turkeys it is a severe disease, but it also may be serious in chickens, though not as dramatic as in turkeys.

Treatment is much the same in both species; enheptin[®][4] soluble (stock solution-½ lb. per gallon of water). Use 1 oz. stock solution per gallon of water for seven days, then reduce dose one-half for seven days more. As a preventive, use ¼ lb. of enheptin per 500 lb. of feed every other week, in chickens until 12 weeks of age and turkeys until one or two weeks before marketing.

Bluecomb, Cholera, and Typhoid. These three diseases should be considered together. They are confusable, but more rightly it should be said they are confused. I think the poultrymen have been impressed unduly by the term bluecomb and every bird that has a darkened comb is considered to be infected with the disease.

Bluecomb is a flock disease and a decrease in total feed consumed is noted, death losses *do not* occur early, and seldom are the combs blue. Several flocks in the same neighborhood are apt to have it at the same time. Ordinarily it is seen in July, August and September. Birds become listless, the combs are deep red to cyanotic in appearance, and affected birds walk with stilted gait much like wooden men. Egg production drops sharply if birds are in production. Postmortem reveals severe dehydration. The crop and gizzard always contain foul smelling food; there are varying degrees of enteritis with a mottled pancreas. Treatment consists, first, of an epsom salts flush (1 lb. of epsom salts in three gallons of water placed before the birds for three hours, followed by natronox[®][3] stock solution (1 lb. per gallon of water with about 1 tsp. of niacin). Use 1 oz. plus 1 tsp. of common salt per gallon of drinking water. Terramycin and polyotic[®][4] also may be used, but are more expensive and it is doubtful if more effective as dehydration must be overcome promptly.

Cholera is an acute disease characterized by finding birds dead on the nests and roosts. Not often are sick birds observed before they die. Postmortem reveals hemorrhages on the pericardial fat, and often about the gizzard. The spleen is normal or pale, and the liver may or may not be enlarged.

Bichloride tablets used according to directions on package for four to six days are effective. Also sulfamerazine or sulmet[®][4] (1 lb. per gallon), used 1 oz. per 1 gallon of drinking water for about three days.

Fowl typhoid is an acute disease and a persistent killer in both chickens and turkeys. Birds appear listless and have a bright, deep red color of comb and wattles with a characteristic yellow diarrhea much like blackhead. Postmortem always reveals a severely enlarged spleen and liver, with a yellowish diarrhea.

Furacin[®][5] suspensoid (stock solution-1 gm. per oz.) cut in half with water, 1 oz. per gallon of drinking water for chickens and 1 pt. per 50 gallons for turkeys is recommended. Use for at least five days in chickens and at least ten days in turkeys.

Hemorrhagic Disease. Cause is unknown. May be serious among young chickens. Characterized by weakness and sudden consistent death losses. Postmortem reveals hemorrhages in the myocardium, breast muscles, and leg muscles. Be aware that it often occurs during treatment of coccidiosis and may be concurrent.

It is advisable to cut protein intake one-half, and avoid extracted soy bean meal sup-

(*Continued on page 286*)

[®][3]Chas. Salisbury & Co., Charles City, Iowa.
[®][3]Pitman-Moore Co., Indianapolis, Ind.

[®][4]Lederle Laboratories Division, Pearl River, N. Y.
[®][5]Eaton Laboratories, Norwich, N. Y.

Symposium On Diseases Of Cattle

Participating were Dr. Roy W. Westcott, South Bend, Ind.; Dr. G. H. Conner, Michigan State College, East Lansing, Mich.; Dr. A. Henry Craige, Pitman-Moore Company, Indianapolis, Ind.; Dr. J. L. Boydston, Wauseon, Ohio; Dr. F. N. Andrews, Purdue University, Lafayette, Ind.; Dr. J. D. Salisbury, Indiana State Board of Health, Indianapolis; and Moderator, Dr. R. C. Klussendorf, Commercial Solvents Corporation, Terre Haute, Ind.

Displaced Abomasum

R. W. WESTCOTT, D.V.M.

This condition occurs at about the time of parturition — from a week or two before calving to five or six weeks afterward. Apparently the heavily gravid uterus is a primary factor in producing the condition, which probably is much more prevalent than most realize.

We believe that as the uterus enlarges in late pregnancy pressure is exerted on the abomasum, which normally lies on the floor of the peritoneal cavity at the right of the rumen.

Sometimes the uterus lies to the left and partly under the rumen, instead of keeping its normal position to the right of the cavity.

The pressure of this position is exerted constantly and forces the abomasum under the rumen. Once over the midline, there is only one place for it to go readily — between the rumen and the body wall and upward to a region of lesser pressure. The pressure is exerted regardless of position or movement of the animal.

This is a relatively new condition, but a serious one in some herds of dairy cattle. More than 35 cases have been treated at Michigan State College. It presents a considerable challenge and questions concerning it are invited. (For detailed report see VETERINARY MEDICINE 49:49 [Feb.], 1954).

Q. How do you diagnose this condition?

Westcott. Most cases are confused easily with a mild attack of ketosis or acetonemia in their general appearance, and they give a mild reaction on the Ross test. The patient picks at hay, but eats scantily. Affected animals usually remain on about subsistence level. As a result of the reduced feed intake and the pressure on the omaso-abomasal opening which restricts passage of ingesta, feces are scanty and hard.

Elevated temperature and rapid pulse, which usually accompany traumatic gastritis, are absent; the respiratory tract normal, differentiating the anomaly. Essentially, symptoms are those of a digestive disturbance and a mild case of ketosis.

History of repeated attacks of ketosis, of prolonged digestive interference, and of late pregnancy are helpful, but surgery may be necessary to confirm diagnosis.

Q. How is the condition treated?

Conner. If the case is presented before calving, two choices exist: (1) Keep the appetite stimulated as well as possible until the calf has been delivered and then operate. (2) Deliver the calf by cesarean section and bring the abomasum back to normal position at the same time.

The surgical incision is made on the left side, as for rumenotomy. The abomasum will be found at the point of incision and will fool a person the first time he finds it there because it will be greatly distended with gas. This gas should be removed by tapping the abomasum with a 14 gauge needle to which has been attached a rubber tube long enough to reach well beyond the incision.

The arm is then passed over and behind the rumen to grasp the abomasum and draw it back to its normal position while pushing with the free hand to force the exposed portion of the abomasum down between the ribs and the rumen so that the entire organ can be freed with the other hand.

Strangely enough, adhesions have not been found.

Westcott. To this I would add that we used to anchor umbilical tapes in the rumen wall and pull up on these to rotate the rumen while pushing the abomasum down, then release the rumen to move in a clockwise direction. However, this presents the danger of tearing the rumen, and we now use the method just described.

The anatomists used to insist that this displacement could not occur, since the organ is anchored anteriorly to the omasum, and by

folds of peritoneum to the reticulum and rumen. But they failed to allow for its tremendous ability to enlarge or stretch under these conditions.

Q. What is the prognosis?

Westcott. These cows seldom die until the condition has persisted so long that they are completely exhausted. They do not thrive, or milk well. They may respond repeatedly to glucose injections, but for short periods only.

Following surgery, and given proper after care, prognosis is good. The earlier the case is treated, the stronger the patient will be, and more rapid recovery may be expected.

Antibiotics: Synergistic Action

A. HENRY CRAIGE, V.M.D.

The question of using antibiotics singly, together with other antibiotics, or with sulfonamides and other pharmaceutical agents, has been discussed widely and studied carefully.

Two antibiotics, working together on one organism and in one area of the body, may accomplish one of three results: (1) The sum of their individual effects, called additive action, (2) a sum greater than additive, called synergism, and (3) a sum smaller than additive, called antagonism. To understand these actions, two things must be realized: (a) The theories were formulated on the basis of test tube or *in vitro* studies, and (b) the results and conclusions apply when a single strain or pure culture of a bacterial organism is used.

Antibiotics have been divided into two groups. Group I includes penicillin, bacitracin, streptomycin, and neomycin. Group II includes chlortetracycline (aureomycin)[®1], oxytetracycline (terramycin)[®2], and chloramphenicol (chloromycetin)[®3]. In general, antibiotics in group I work together additively or synergistically, but almost never antagonistically. The members of group II similarly work together. The problem in veterinary practice is that the clinician works with living animals, and with mixed infections. Hence the matter of synergism and antagonism is one of academic interest rather than one that may be used in practice. The veterinarian needs a wide variety of therapeutic products, because he deals with several species of animals, many types of infections, and an infinite number of complications and variations.

Q. How about combinations of antibiotics and other medicines?

Craige. In general, the antibiotics may be used with other treatments to good advantage, as you all know. The pathway of attack on the infectious agent seems to be the determining factor — antibiotics appear to work through channels and enzyme pathways not disturbed by sulfonamides, specific antiserums, and other medicinal agents. Antibiotics may be used widely with a good chance of being helpful, and almost no instances of interfering with other medication.

Teat Surgery

J. L. BOYDSTON, D.V.M.

One little teat operation has given me great satisfaction because it has made many clients happy, and they and their neighbors have occasion to call for it frequently.

Hard milking cows are unpopular because they require a great deal of effort if milked by hand and they upset the schedule of machine milking.

In preparing for this operation, cleanse the teat with warm water and antiseptic soap, dry, and apply a mild antiseptic. The technic of the operation is simple. Using a single edged teat knife, insert it through the teat canal and cut on the down or withdrawal stroke, using pressure of the thumb over the cutting edge to determine the length and depth of the incision. Usually the stricture is readily palpated and the knife is easily controlled to cut only in that area. The number of incisions will vary with the severity of the stricture, three being average. These are, of course, spaced around the teat canal.

This has been used frequently, and has never caused mastitis to my knowledge.

Q. What about aftercare?

Boydston. Nothing special. You each have your preferred method of handling mashed, bruised, and torn teats. The one you and your client like is the one to use.

Hormone Feeding

F. N. ANDREWS, Ph.D.

Interest in sex hormones has increased greatly since the middle of 1954, and especially so in the feedlots of the Midwest. This interest was stimulated by approval of the Food and Drug Administration, U. S. Department of Agriculture, for use of these substances in

(*Continued on page 283*)

®1Lederle Laboratories Division, Pearl River, N. Y.
®2Chas. Pfizer & Co., Brooklyn, N. Y.
®3Parke, Davis & Co., Detroit, Mich.

Basic Treatments for Common Ophthalmic Lesions†

HARRY J. MAGRANE, JR., D.V.M., Mishawaka, Indiana

MINIMUM equipment which we believe is necessary for proper eye examination includes (fig. 1):

(1). A soothing eye wash. Formula: First obtain a clean gallon bottle and a scale or balance graduated for ounces. Measure out and empty the following drugs into the clean gallon bottle: ½ oz. each of sodium bicarbonate, boric acid, and sodium chloride. Then add 2 oz. of glycerine. Add tap water to make one gallon. To this add 4 cc. of roccal®[1] solution. This makes a 1:10,000 roccal dilution in the formula. One half of a coloring tablet also may be added to make it more attractive for dispensing purposes. The mixture is shaken well and allowed to stand overnight before use. To make a clear solution filter the eye wash through cotton or paper filters into pint bottles for your own use or into 1 oz. eyedropper bottles for dispensing. The filtering is not necessary for effectiveness but improves the appearance of the solution.

(2). Ziegler eye flushing bottle. This 8 oz. bottle sells for $2.75. It may be obtained through many supply houses. (Fig. 1).

(3). A local anesthetic solution. We prefer ophthaine®[2] solution supplied in 15 cc. dropper bottles and available through your veterinary supply houses. We like this best because there are no stinging sensations, allergic manifestations, or conjunctival irritations as with some other types of local anesthetic solutions previously used. Our usual procedure when an eye case is first presented at the hospital is to inform the owner that we wish to prevent squinting and relieve any pain in the eyes before examination so we are going to instill a local anesthetic. One or two drops of ophthaine are placed in each eye and the owner is asked to wait with their pet for five minutes so that adequate anesthesia may be obtained before close examination. When the pet is placed on the table, we flush out the eyes by means of the Ziegler flushing bottle to remove any exudate present and once more instill another drop of ophthaine and proceed with our examination.

(4). A sterile aqueous solution of 2% fluorescein dye. This can be obtained from your local drug store in many cases. You may also procure it at Ophthalmos, Inc., of Union City, N. J. If you obtain it from your local druggist and it is not sterile, it should be autoclaved before use.

(5). Berger eye loupe. This has a magnification of 2½ times and affords an excellent means of detecting corneal abrasions, eye lash irritations, pigment spread, follicular conjunctivitis and foreign bodies. (Fig. 2). You may obtain this from most surgical supply houses. The cost is $7.50.

(6). Pen light or otoscope light to use in conjunction with the Berger eye loupe magnification. Do your examination in a dark or darkened room for best results.

(7). Ophthalmoscope. This can be used to study the lens, vitreous, and fundus. The average practitioner has not developed proficiency in the use of this instrument, but if he

†Presented at the 71st annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1955.

®[1]Winthrop-Stearns, Inc., New York, N. Y.

®[2]E. R. Squibb and Sons, 745 Fifth Ave., New York, N.Y.

can only employ it enough to at least recognize that there is some gross abnormality in the deeper structures of the eye, he can at least refer the case to a specialist and gain his client's admiration for the detection of it.

(8). Two pair of thumb forceps. One smooth edge and one rat-tooth type. These are used to facilitate examination of the membrana nictitans for foreign bodies and in the treatment of follicular conjunctivitis.

Follicular Conjunctivitis

Cauterization is indicated especially when follicles are observed on both sides of the membrana nictitans. The procedure recommended and employed in our practice is to instill ophthaine in the eyes, hold the third eyelid up and away from the cornea with the smooth edged forceps. With the rat-toothed forceps holding the copper sulfate crystal, lightly rub the follicles on the lateral or outside surface first and then on the medial surface taking care to avoid touching the cornea with the crystal. The area is then immediately flooded with eye wash by an assistant using the flushing bulb.

In some rare instances we have found it necessary to keep the animal in the hospital for this treatment if the patient is a highly excitable type and in these cases we give ¼ to ½ gr. of morphine sulfate subcutaneously one hour prior to treatment. Practically all cases are treated as out-patients, however, with the owner holding the dog and one assistant doing the flushing part of the procedure.

I know many veterinarians are guilty of letting an owner's remark go unheeded, "My dog's eyes matter or water some every day." You can reply, "Well, this is common in this breed," or you can appear interested in this comment and try to discover a cause for the condition. In the majority of cases one will find moderately severe to severe follicles formation on the membrana nictitans. When owners see these blister-like lesions they can easily understand the cause for the watery condition.

I should like to add that it is well to remind your client that this is a chronic condition caused by some foreign irritants such as dust, dirt, or wind. Cauterization changes the process to an acute condition and even though the eyes may be more inflamed for a few days the follicles disappear and a smooth, clean, healed surface results with a cessation of discharge. Dispense eye wash and castor oil drops or cod liver oil ointment for aftercare or if some pus is present at the time of cauterization, an antibiotic ophthalmic ointment of choice may be used three times a day, following the wash, as follow-up home treatment.

Hypertrophy of the Orbital Gland

Glands at the medial canthus commonly are called Harder's or Harderian glands, but veterinary anatomists tell us that there are no such glands in any of the domestic animals except the pig. The preferred nomenclature is orbital glands. It is actually what anatomists call a "mixed gland" located on the medial surface of the membrana nictitans.

Hypertrophy to such extent that glands protrude over the lids is not uncommon. Some terrier breeds appear to be more susceptible than others. Cause is unknown though they are observed concurrently with follicular conjunctivitis occasionally. Unless the condition is relieved by surgical extirpation of the glandular tissue, inflammatory reactions may occur that set up a keratitis.

Surgical Removal

Our procedure for removal includes, first

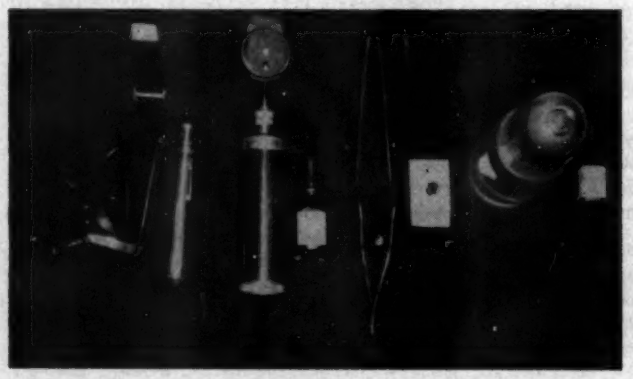

Fig. 1. Minimum equipment needed for proper eye examination. (l. to r.) Binocular loupe, pen light, ophthalmoscope, local anesthetic solution, two pair of thumb forceps (one smooth edge and one rat-tooth type), copper sulfate crystal, eye wash flushing bottle, 2% sterile fluorescein dye.

Fig. 2. Gross examination of the eyes with a Berger binocular eye loupe (2½ X magnification) and otoscope light.

of all, instillation of an appropriate local anesthetic agent. General sedative agents in addition may be desirable in some patients. When sensitivity is lost we pass an Allis forceps down through the loop of a tonsil snare, grasp the orbital gland, slip the snare down around the base of the gland and squeeze the gland off close to the surface of the membrana nictitans. We prefer this method for two main reasons: (1) It is safe. The smoothness of the snare wire eliminates the possibility of corneal injury if the dog should jerk; (2) there is little or no hemorrhage. No after care is needed unless one wishes to dispense eye wash and castor oil drops or cod liver oil ointment.

Hypertrophy of the Membrana Nictitans

This is a condition where the membrana covers a portion of the globe and stays that way. It is a constant source of irritation. In some cases the third eyelid is observed to be abnormally enlarged, may have become chronic and causes considerable discomfort. It is well to remember that this condition may be allergic in origin. For that reason local antihistamine therapy may be tried either alone or in combination with hydrocortisone or ointment applied three or four times daily. In case symptomatic treatment fails, surgical removal is necessary, but only as a last resort. We must remember that this lid is an important protector of the eye, especially in hunting breeds, and removal of it exposes the cornea to potential damage.

Chemosis or Edema of the Bulbar and Palpebral Conjunctiva

Chemosis may be allergic, irritative, or infectious. Hydrocortisone ointment, or antihistamine ophthalmic solution, three times daily is recommended therapy. We use trimeton®[3]-maleate solution ophthalmic (0.5%) for antihistaminic action. Others which have proved satisfactory in our hands are histadyl®[4] and antistine®[5]. All of these are ophthalmic solutions. Frequent application of cold packs may be used to advantage. If a favorable response is not obvious within one or two days, subconjunctival injection of hydrocortisone should be administered. (See fig. 4).

Excellent results have followed subconjunctival injection of hydrocortisone when this product is indicated. We employ a saline suspension of hydrocortisone acetate containing 25 mg. per cc. of the active agent. Administration follows instillation of an appropriate local anesthetic in doses from 0.25 to 0.5 cc. A 25-gauge ¼ in. needle is used as illustrated (fig. 4). Injection is made at the 12 n. position, 4 to 5 mm. from the upper limbus. Subsequent injections may be made in 48 to 72

Fig. 3. Extirpation of the orbital glands with Allis forceps and tonsil snare.

hours when indicated. Within 24 hours after injection a yellowish-white cortisone deposit will be observed beneath the conjunctiva. This may remain for several weeks following injection. This procedure is especially useful when the dog is hospitalized and one wishes to save the time and bother of frequent applications of hydrocortisone ointment.

®[3]Schering Corp., Bloomfield, N. J.
®[4]Eli Lilly & Co., Indianapolis, Ind.
®[5]Ciba Pharmaceutical Products, Inc., Summit, N. J.

Ecchymosis of the Bulbar Conjunctiva and Hyphemia

Ecchymosis refers to minute hemorrhages within and under the bulbar conjunctiva and hyphemia to blood in the anterior chamber. Either of these conditions may be observed following head injury. It can be produced when a mean dog pulls and jumps in the air on the end of a lead or by a blow on the head. Nearly every dog hit in the head by a car exhibits some forms of these two conditions. Do not become alarmed about them. Owners become alarmed and you may use hydrocortisone ointment three or four times a day, or a subconjunctival injection of hydrocortisone to facilitate reabsorption. If nothing is done the hemorrhage will absorb eventually.

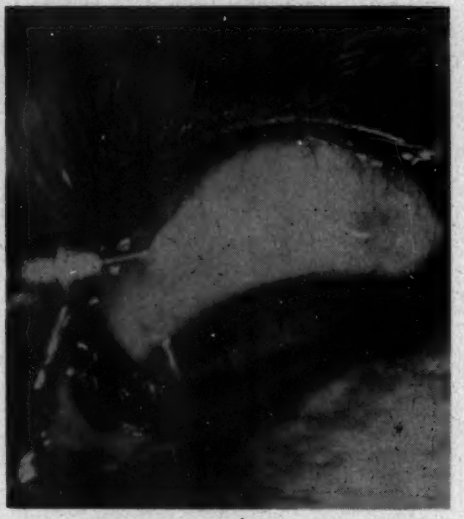

Fig. 4. Technic of subconjunctival injection of hydrocortisone using a 25-gauge, ¼ in. hypodermic needle.

For the hyphemia or hemorrhage in the anterior chamber, usually all that is needed is to leave it alone. There may be cases where the hemorrhage is most excessive and you feel that some method of draining it off is necessary. In this case paracentesis may be performed by use of a no. 11 Bard-Parker blade. In any event, if paracentesis is done, it is most important to use atropine after surgery to assure dilation of the pupil and to prevent adhesions of the iris.

Trichiasis

Trichiasis or distortion in the growth or curl of the cilia or eyelashes may cause severe irritation by turning inward instead of outward to rub against the cornea or conjunctiva or both. To detect this, it is essential that we have suitable magnification. We believe it is one of the most important single causes of watery eyes and pigmentary keratitis, especially in the Pug and Pekinese breeds. In numerous cases referred to our hospital, this condition has been overlooked as the cause of the pigmentary keratitis, ulceration, or conjunctivitis. One may select from three courses of action to correct abnormal growth of lashes. The first is to cut the lashes flush with the lid; second, to pull out the lashes with tweezers. Neither of these two methods affords permanent relief, so the best method is the third one, which is cauterization to prevent growth. This can be accomplished by using a fine pointed epilation needle. Carefully insert needle into the hair follicle and burn the base by electric current and then pull out the dead cilia. Aftercare consists of eye wash and instillation of an antibiotic ointment of choice three times a day for several days.

Injury to the Cornea

Minor injuries to the cornea are frequently noted as scratches inflicted by a cat, branch, or thorn. These, barely apparent by gross examination, are revealed dramatically after fluorescein stain. When presented for examination, watery eye and some photophobia may be mild, though apparent. The dye can be used to detect abrasions, infiltrations, and ulcers of the cornea and define their limits. Its use makes a tremendous impression on most owners since it can show the damage already present by the abrasion or ulcer, and when the animal is returned for a checkup in 48 or 72 hours one can illustrate healing progress. It is of great value both from a diagnostic, as well as a prognostic, standpoint. It is best to use sterile fluorescein dye for staining purposes. There is some degree of irritation from repeated staining. It would be most improbable for you to cause much corneal irritation from only one restaining of the eye, but to adopt a procedure such as daily or every-other-day staining to check the progress in healing of an area is hazardous. If we discover that an abraded or ulcerous area is not healing as shown by the staining, therapy is altered.

Corneal Ulceration

Our basic procedure in treatment of ulceration of the cornea may be outlined as follows:

(*Continued on page 274*)

Management Of The Canine Cardiac Patient†

DURWOOD L. BAKER,* D.V.M., Ames, Iowa

MANY, if not all, heart lesions may in time cause the heart's failure. The discussion in this paper primarily concerns the treatment of individuals which are potential victims of chronic (congestive) heart failure. The prevention of cardiac failure in dogs with known heart disease is important. Respiratory infections should be avoided if possible. Chronic cough should be controlled with codeine. Restriction of exercise is imperative. Anemias should be combatted. Rapid or excessive intravenous administration of fluids should be avoided. If it becomes necessary to administer a general anesthetic by intravenous routes, the administration should be very slow. Many of these animals will develop surgical anesthesia with considerably less than the usual amount of the anesthetic drug. Dietary control of obesity may diminish the potentiality of cardiac failure. The sodium intake should be restricted.

Endocardial lesions are important underlying causes of heart failure. Compensation is effected in many individuals with endocardial lesions by cardiac enlargement and later by an increase in circulating blood volume (Friedburg)[6]. There are many more predisposing causes such as congenital anomalies, myocarditis, anemia, filariasis and others which could be mentioned. There are also some clinical precipitating causes of cardiac failure such as infections, diminished coronary blood flow, changes in rate and rhythm, pregnancy, hemorrhage, anemia, and overexertion. Yet in spite of our awareness of many of the causes of heart failure, we do not know or completely understand the mechanism involved. Some individuals live happily for years with extensive cardiac lesions and then suddenly may develop cardiac failure. Others die of cardiac failure virtually without gross lesions of cardiac pathology. When, however, the myocardium becomes unable to maintain an adequate output, the clinical syndrome of congestive heart failure becomes apparent.

Most authorities agree that the heart does not fail, as a whole, simultaneously. Signs of failure of the left side are those of passive congestion of the lungs . . . Dyspnea even at rest, (cardiac asthma) cough, moist rales, cyanosis, restlessness, and anxiety. There is an accentuated second heart sound in the pulmonic area. In cases of right-sided heart failure there may be ascites, edema, hydrothorax, engorgement of veins, enlargement of the liver with malfunction and occasional jaundice, cyanosis, weakness, and gastrointestinal disturbances. Renal symptoms, especially oliguria and nervous disturbances, also may be present. Right-sided failure is often associated with left-sided failure. Left-sided failure, in turn, is the most common cause of right ventricular failure. Whether it be left-sided or right-sided failure, as the heart's efficiency decreases, less than the normal volume of blood is delivered to the arterial system. As cardiac output decreases, circulatory insufficiency develops in the arterial system and venous congestion occurs due to a decreased propulsive effect of arterial circulation. Venous stasis and the occurrence of ascites and edema are further responsible for decreased return of venous blood to the heart. This, then, results in inadequate auricular filling and further reduction in cardiac output.

It is usually advisable to withhold a prognosis until one can evaluate the results of therapy in cases of progressive or decompensated heart failure. Animals that can be maintained by a restriction of the diet and restriction of exercise may live for some time. The prognosis is less favorable if medicinal therapy is necessary continuously and signs of systemic congestion are present. If repeated paracentesis is necessary, or generalized edema is present, prognosis is poor.

Treatment

The treatment of these individuals is based upon improving cardiac efficiency through the use of digitalis, rest, and regulation of the sodium and water content of the body. Each case must be considered as an individual and adjustments in therapy made to fit the chang-

†Presented at the 71st annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-15, 1955.

*Associate Professor of Veterinary Medicine and Surgery, Veterinary Clinics, Iowa State College.

ing clinical needs. Digitalis has been for many years, the drug of choice in aiding the failing heart. The most important cardiac action of digitalis is its direct effect on myocardial contraction. Glycosides of digitalis enter the myocardial cells where, in turn, aglycones are yielded. The aglycones in some unknown manner of action affect the myocardial cells beneficially and a more forceful systolic contraction of the heart results. Digitalis in addition to increasing the force of systolic contraction also increases the work capacity of the heart, enhances the completeness of ventricular emptying, and increases the efficiency of myocardial contraction. It appears that the major benefit of digitalis in heart failure is due, primarily, to its improvement of cardiac contraction and efficiency.

Congestive heart failure is the primary indication for digitalis therapy. Auricular fibrillation or auricular flutter is another indication for digitalis. Digitalis is of benefit only if the symptoms are due either to impaired myocardial function which can still be helped by this drug or to ventricular tachycardia secondary to auricular fibrillation. Digitalis is of extremely limited value in cases of cardiac failure due strictly to mechanical abnormalities and is ineffective when myocardial damage is too extensive or severe to allow the muscle to respond to the drug.

Two forms of digitalis are in common usage in veterinary medicine. The powdered, whole leaf of the second year *Digitalis purpurea* plant is administered in the form of tablets or capsules, rarely as a tincture. The tablets or capsules usually contain ½, ¾, 1, or 1½ gr. and possess the advantage of accurate dosage and convenience of administration. Only about one-fifth of the dose of the powdered leaf is absorbed from the gastrointestinal tract. Digitoxin is a relatively pure glycoside of digitalis isolated from the leaf of *Digitalis purpurea*. An important advantage of digitoxin is its uniform and constant potency. The toxic symptoms of overdosage with digitoxin are identical with those caused by whole leaf digitalis. Digitoxin is absorbed completely from the intestinal tract as manifested by the fact that the dose is the same whether the drug be given orally or intravenously. There is virtually no nausea or vomiting due to gastric irritation of digitoxin, but central nervous nausea occurs as with other digitalis preparations.

The dose of digitalis must be governed by clinical results. As with many other drugs one can not adhere to a rigid dosage schedule. Detweiler[3] has suggested a total digitalizing dose schedule which is extremely helpful in making primary calculations. A portion of that schedule is as follows: If using digitalis tablets or capsules U.S.P. 0.14 gm. per 10 lb. body weight, discounting weight due to edema, is suggested. If using digitoxin U.S.P. the recommended dose is 0.14 mg. per 10 lb. body weight, again discounting weight due to edema. Note this is a guide not for individual doses nor for daily doses but for total digitalizing dosage. The rate of administration of this total digitalizing dose depends upon the severity of the case. Where an emergency exists, one-half the digitalization dose of digitoxin may be injected intravenously. Its activity becomes apparent about one hour after intravenous administration. Its maximum effect requires four hours or longer. Injections of about one-eighth of the digitalization dose may be given at four- to six-hour intervals as indicated.

A second method in which either digitalis or digitoxin may be used is known as the intensive method. One-half the calculated dose is given, followed in six hours by one-fourth the dose, and this in turn followed at six-hour intervals with one-eighth the dose until a definite response is observed. If there is no response other than diarrhea, this schedule is maintained even though the calculated digitalizing dose is exceeded.

Moderate digitalization is useful in cases with well developed, but not urgent, signs of congestive heart failure. One-eighth of the calculated digitalization dose is given at six- to eight-hour intervals until a response is obtained.

It is important to remember that both the suggested total digitalization dose and the rate schedules are guides. Each case must be considered individually. Digitalization is accomplished only when full therapeutic action occurs. The drug should be given until such therapeutic action occurs or until manifestations of a toxic nature require cessation of administration. Individuals differ greatly in their tolerance of digitalis and consequently some present symptoms of toxicity on doses usually considered inadequate therapeutically. In some the toxic and therapeutic doses are nearly identical and it is difficult to obtain satisfactory clinical improvement without evoking toxic symptoms. The most common signs of overdosage with digitalis are gastrointestinal disturbances and alterations in cardiac rhythm. Anorexia, nausea, and vomiting are common cardinal symptoms of overdosage. A mild diarrhea is not uncommon in dogs on digitalis

therapy. Premature ventricular contractions, tachycardia, excessive slowing of the pulse, heart block, and depression are symptoms of digitalis intoxication.

After the clinical response to digitalis is satisfactory, a daily maintenance dose must be established. This is usually between one-fifth and one-tenth the total digitalization dose. This must, of course, be adjusted to the clinical needs of the animal.

Aminophylline often is useful in patients receiving large doses of digitalis and in those individuals in which the toxic and the therapeutic doses are nearly identical. Aminophylline exerts what might be termed a "sparing" effect on the heart in that it protects this organ against degenerative changes effected by large doses of digitalis glycosides, and it dilates the coronary blood vessels, thus increasing the flow of blood to the myocardium[4]. It is useful in cardiac asthma for its broncho-dilating effect[3]. One-half to 1½ gr. are given three times each day. In animals exhibiting dyspnea in the absence of cyanosis, small doses of morphine subcutaneously may relieve the labored respiration. Oxygen is indicated in animals which are cyanotic.

Enforced rest and the limiting of physical activity is an important part of the management of cardiac cases. The animal should be confined to a cage or small room. If restlessness occurs, small repeated doses of phenobarbital should be given to encourage rest and decrease physical activity. Phenobarbital not only promotes sleep but, by virtue of decreasing physical activity, it also reduces the body's oxygen and circulatory needs. The animal should not be allowed to jump out of or into its bed or cage. If the cage is so located that he can not walk in and out he should be lifted carefully so as not to increase the pressure on the heart. If it is necessary that the animal be allowed out-of-doors for purposes of elimination, he should not be allowed to run up or down stairs nor in and out, but should be carried. When out-of-doors he should be leashed and walked slowly, avoiding exciting influences whenever possible, until he has completed normal excretion. It is not our intention to make "cardiac-cripples" out of these animals for, if such is the case, other means shown should be recommended. It is the intent instead to limit the activity of these animals until such time as favorable response to therapy has occurred. Even then less rigid restriction of exercise is still in order.

The food should not contain any salt nor should any sodium-containing drugs be administered. Foods of animal origin often contain an excessive amount of sodium for use in the cardiac patient. Many foods of vegetable origin, however, are relatively low in sodium content. Examples are fresh or frozen vegetables (to which no salt has been added) and certain cereals, for example: Cream of wheat, wheatina, ralston, shredded wheat, and puffed rice.

Sodium output should be enhanced as sodium intake is curtailed. Some individuals on digitalis therapy along with a restricted diet respond satisfactorily without the use of diuretics. The fewer therapeutic measures necessary the better, in general, is the prognosis. Often patients with ascites and edema require diuretics to facilitate sodium and water elimination. Mercurials, acidifying salts, and xanthine derivatives are used most commonly. The exact mechanism by which mercurials produce diuresis is uncertain. It is most probable that they act directly on the kidney, decreasing the reabsorption of sodium and water by the proximal tubules. Mercurophylline Injection, U.S.P. is given preferably intravenously in doses of ½ to 2 c.c. daily, or every second or every third day as needed. Excessive sodium depletion and dehydration is to be avoided. The use of acidifying salts such as ammonium chloride frequently enhance the action of the mercurials. Five grains of ammonium chloride may be given three times daily for two days prior to injections of mercurophylline. The chief contraindication to mercurial diuretics is kidney impairment in which the urine is pale and of low specific gravity. The urine should be examined for evidence of kidney damage before each administration of mercurial diuretics. The xanthine derivatives although somewhat inferior in diuretic action to the mercurials, have an advantage in that they may be given orally. Theobromine calcium salicylate (Theocalcin)® is given in doses of ½ to 1 gm. orally two or three times daily. The xanthines frequently lose their therapeutic effectiveness after four or five days usage. However, after omitting medication for a few days, therapy can be reinstituted and therapeutic results expected.

Diet should be given due consideration in the therapy of heart cases. As previously mentioned, there should be a restricted sodium intake. Unless there are indications to the contrary, undernutrition and frequent feedings are the main principles. The benefits of undernutrition are of prime importance in obese

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individuals. These benefits result from the reduction of the work load of the heart. The ration should be divided to provide small, frequent feedings. This avoids excessive gastric filling with consequent abdominal distention, increased pressure on the diaphragm and diminution of vital capacity due to pulmonary compression. Obese individuals should be reduced by initially offering no food for 24 to 48 hours. The following feedings should be limited in their fat and carbohydrate content. Thyroid extract, because of its reflex stimulating effects on the heart, is contraindicated. The vitamin content of the diet should be adequate or the diet supplemented with vitamin concentrates particularly those of the B-complex group. Palatability of the diet also is important. Usually a bland, low, residue diet is better tolerated than one with considerable roughage since the latter tends to produce distention and flatulence.

Paracentesis of the pleural or peritoneal cavities may afford considerable relief when the presence of the fluid results in discomfort. Ascitic fluid is relatively high in protein; consequently dietary adjustments may be indicated following abdominal paracentesis. A high protein diet may actually be of aid in controlling ascites.

It is advisable to determine the red blood cell count and hemoglobin level. If any evidence of anemia exists one should attempt to determine the causative factor and eliminate it by therapy. By so doing, the work load of the heart may be decreased considerably, the efficiency of the heart action increased, and degenerative changes of all tissues forestalled.

Much credit is due Detweiler, Bourne, Lannek, and Gold for their contributions in cardiology. They and many others have led the way in the study of cardiac diseases. As a result we are now able to care adequately for many animals previously believed hopeless. There is still much to be learned about cardiac disease but, through prudent management, we can lengthen life of many pet animals.

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Common Ophthalmic Lesions

(Continued from page 270)

(1) Irrigation of the conjunctival sac, (2) instill local anesthetic, (3) stain ulcer to determine its extent and record this on a hospital record for comparison on recheck later, (4) flush the eye again, (5) repeat instillation of local anesthetic, (6) cauterize ulcerous area with strong tincture of iodine by means of a small wisp of cotton rolled on a sharp pointed toothpick. Give special attention to cauterization of the periphery of the ulcer, (7) immediately flood the area with eye wash again, (8) instill a drop of 2% aqueous solution of atropine sulfate. It is quite important to remember that atropine always should be used in central ulceration to relieve pain from ciliary spasms and for possible prevention of adhesions between the iris and cornea, (9) an antibiotic ointment is then dispensed for application by the owner three to four times daily in the eye.

When the animal is returned in 48 hours for a checkup, we adopt the following procedure: (1) Restain the eye, if indicated, to check the progress of healing, (2) instill atropine in any case to continue pupil dilation, (3) if healing course appears slow, inject foreign protein in the form of omnadin®*. Two cc. are given subcutaneously for the average size dog. Slow healing is also an indication for the daily administration of vitamins A, B complex, and C.

It is well to remember that antibiotics may retard healing of tissue of the eye structure, and if its use has been prolonged, it might be wiser to just cauterize, employ atropine, and then use only cod liver oil ointment. The eye then may be bandaged. Change dressings at 48 hour intervals. Care must be taken in bandaging to avoid pressure necrosis.

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Slogan for National Dog Week (Sept. 18-24, 1955) is "Member of the Family". Poster designed by Albert Staehle for this year's observance portrays a typical American family with their Beagle waiting at the window for Dad to come home.

▼ ▼ ▼

Finland was declared rabies-free in August 1954.

®*Winthrop-Stearns, Inc., New York, N. Y.

Illustrated Radiology†

FRANKLIN GRUESSER, D.V.M.*, Akron, Ohio

THE presentation of roentgenograms that illustrate lesions and pathological processes at large gatherings has been unsatisfactory generally. Recently closed-circuit television projection of *x*-ray films made possible demonstration of detail visualized by roentgen-ray photography. This requires extensive and costly equipment operated by specially trained technicians. In order to circumvent difficulties, we have reproduced some of our more interesting plates on 35 mm. kodachrome slides. The process is simple and as illustrated in figure 1. The *x*-ray plate is mounted on the ordinary view box, an exposure meter is then placed directly on the film at a place representing the average density. The reading thus afforded insures proper exposure. The camera is a 35 mm., single lens, reflex, Zeiss pentacon.

Fig. 1. Photographing an x-ray plate mounted on a standard viewer. No lights other than those inside the viewer are required for proper exposure on kodachrome film.

The ground glass focusing feature on this type camera insures sharp focus, enabling the operator to outline the area covered by the lens so that one is positive of what portion of the *x*-ray film will be represented on this slide. Color film is used so that there is no reversal of the photographic image as in black and white film, and the completed slide is returned ready for projection. When these 2" x 2" slides are projected, enlargement without distortion is accomplished, making possible illustration of *x*-ray detail to large groups.

A sewing needle in the soft tissues of the throat region is visualized clearly in figure 2. It may be pointed out here that there is double loss of detail in preparation of black and white glossy prints from kodachrome slides and further loss in photoengraving processes. Roentgenography of any swelling in the submaxillary or cervical region will confirm or eliminate the presence of such a foreign body without the rather embarrassing procedure of repeated lancing and search of such a lesion. *X*-ray technic for this film was: 20 milliamperes (ma), 58 kilovolt-peak (kvp), ½ second, 40-inch focal film distance. The cervical region measured 6 cm. and a Bucky diaphragm was used to help eliminate secondary radiation.

Figure 3 illustrates a foreign body rather frequently observed in small animal practice. The sponge rubber ball may be noted, somewhat dimly, filling the stomach just posterior to the diaphragm. In this case, a mature Boxer; the ball swallowed during the excitement of play, measured 3.5 in. in diameter after removal by gastrotomy. For this picture the following technic was used: Potter-Bucky diaphragm, 40-inch focal film distance, 18 cm. thickness of part, 68 kvp, 100 ma, 1/10 second.

Diaphragmatic hernia is observed commonly in dogs presented at our clinic. Figure 4 illustrates the radiographic appearance of uni-

†Presented at the 71st annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1955.

*Staff member, Akron Veterinary Hospital.

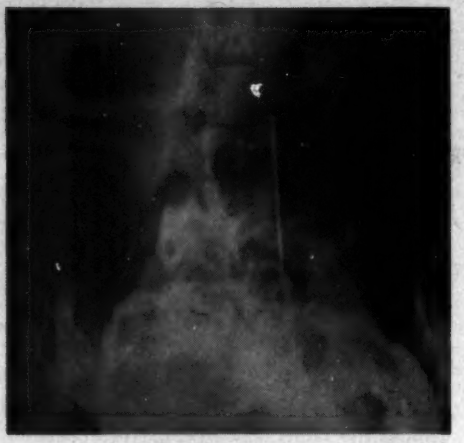

Fig. 2. X-ray visualization of foreign body (needle) in throat region.

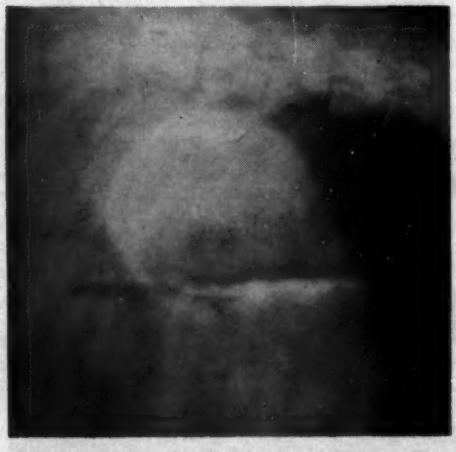

Fig. 3. Sponge rubber ball in the stomach may be demonstrated on an x-ray plate by use of a moving grid, Potter-Bucky diaphragm.

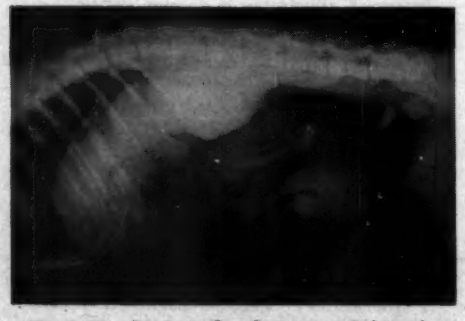

Fig. 6. Visualization of soft-tissue pathology by pneumoperitoneum technic.

lateral diaphragmatic hernia. The heart is displaced into the right chest. A lobe of the liver and the spleen have herniated into the left chest collapsing the lung on this side. The usual dome-like appearance of the diaphragm is absent. The diaphragm shadow ends at midline. Contrast the black appearance of air in the right lung areas with the appearance of more dense tissue in the left chest. Technic was: 40-inch focal film distance, 16 cm. chest, 48 kvp, 50 ma, 1/20 second.

Many of us have been confronted with the hard to palpate bitch who has had several puppies. The question of whether or not all have been delivered may be revealed by radiography. Roentgenogram (fig. 5) at term easily and conclusively answers such question. Demonstration of fetuses earlier in the pregnancy is more difficult. Technic used is 40-inch focal film distance, 16 cm. thickness of part, 65 kvp, 100 ma, 1/10 second, Bucky grid.

Demonstration of intra-abdominal masses is perhaps the most difficult for the average veterinary radiographer. Figure 6 illustrates the use of air as a radio-opaque medium to define more clearly intra-abdominal pathology. In this case, a seven-year-old cat; the intra-abdominal mass is outlined clearly just anterior to the urinary bladder on the lateral view. The presence of gas in the intestine and the position of the mass made us suspect that it was in, or on, the cecum or ileum. At surgery, a tumefied cecum was removed which proved to be a leiomyosarcoma. From a radiographic standpoint, note how clearly the entire intestinal tract is defined. Note also the definition of the liver and kidney shadows. This type definition is impossible without pneumoperitoneum. Technic was: Under anesthesia 150 cc. of air was injected into the abdominal cavity using a 20-gauge needle attached to the bulb of an atomizer. Thickness of the part was 6 cm., 40-inch focal film distance, 52 kvp, 20 ma, ½ second using the Bucky grid.

Summary

It is well to remember that an *x*-ray picture may be likened to an oil painting. By studying the picture carefully, intimate details gradually come into view. Study each part, each organ, and determine the abnormal structures by comparison with known normals. In this manner the roentgenogram becomes a fascinating puzzle which is solved by knowledge and experience of the radiologist, coupled with the findings of the careful clinician.

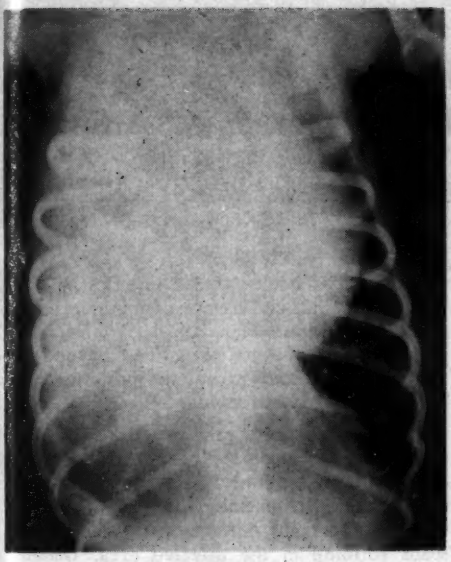

Fig. 4. Diaphragmatic hernia (l). Note displacement of heart and loss of dome-shape appearance of diaphragm.

Antimalarial Effective Anthelmintic

Quinacrine hydrochloride (atabrine)® well-known antimalarial used extensively during World War II has been shown to be an effective anthelmintic for the removal of common tapeworms of dogs. Preliminary observations reported by Link and Smith (*Jour. Am. Vet. Med. Assn.*, 125:461 [Dec..], 1954), indicate that atabrine may be useful for elimination of *Dipylidium caninum* and *Taenia pisiformis*.

The drug was given per orally in gelatin capsules to a group of mongrel dogs known to be infected with one or both common tapeworms. Dose used was 10 to 20 mg. per pound of body weight. Castor oil was given in some cases but its value was not determined. Tapeworms were expelled from all dogs treated. Autopsy revealed ten, or 91%, of treated animals completely freed from *T. pisiformis* and an equal number, or 85% of the group, freed from infection by *D. caninum*. All dogs defecated and eliminated worms within ten hours after treatment. Worms were stained a deep yellow but were active when passed.

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Fig. 5. Fetuses in utero at term.

Life Cycle, Diagnosis And Treatment Of Various Mites That Attack Small Animals†

F. R. KOUTZ,* B.S., D.V.M., M.Sc., Columbus, Ohio

PARASITIC mites on small animals have been known for centuries but many phases in their life cycles are only incompletely understood and treatment is often only partially successful.

Three species of mites on dogs are of importance: *Sarcoptic scabiei* var. *canis*, (fig. 2) *Demodex canis*, (fig.4) and *Octodectes cynotis*. The economic importance of each of these depends on their prevalence in the locality. In some sections of the country, one species of mite often is common while in another it is unknown. Other mites, *Bdellonyssus bacoti* and *Dermanyssus gallinae*, occur as incidental infections or probably as accidental invasions.

Sarcoptic Mange

The life cycle of *Sarcoptes scabiei* is fairly well known consisting of ova, larva, nymph, adult male, immature, and mature female. The mature female tunnels under the skin laying ova as it burrows. In the tunnels, the three-legged larva hatch from the ova and come to the surface of body. After feeding it moults through the nymphal stage and then into an adult. The entire cycle usually takes from ten days to two weeks for completion.

Mites are readily identified, (fig. 2) having small, circular bodies with four pairs of short legs in the adult and nymphal stages and three pairs in the larval stage. The legs, terminating in bell-shaped suckers, all extend beyond the margin of the body except the posterior pair; the head is as broad as long.

Lesions produced are varied. The first usually are found on the head, then spread to other parts of the body. As the mites burrow, they cause intense itching and, as a result, the skin becomes inflamed, then dry with scabs forming in the affected area. Usually, in the beginning of the disease process, only small vesicles may be seen, but as the lesions spread the skin becomes dry, rough, thickened, and often forms folds. Hair falls out, leaving the body denuded and covered with dry scabs and crusts.

Follicular Mange

Probably the worst type of mange, the most prevalent, and the hardest to cure, is demodectic mange (fig. 3). The life cycle, while not completely known, does follow the typical mite cycle with oval, larval, several nymphal, and adult stages. Most of these are thought to occur within the hair follicles and sebacious glands, although the mites have been found in lymph glands and other body tissue.

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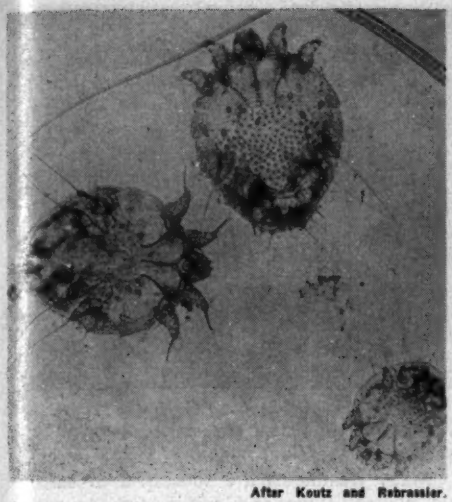
Fig. 1. Sarcoptes scabiei mange. Advanced infestation and extensive involvement. Severe pruritus is characteristic.



After Koutz and Rebrassier.

Fig. 2. Sarcoptes scabiei mites — dog. Low power.

These mites have small vermiform bodies consisting of head, thorax, and an elongated annulated abdomen. There are eight short, stumpy legs on the anterior part of the body in the nymphal and adult stages, while in the larval stages, there are only three pairs.

Skin lesions characterizing demodectic mange may be divided into two general groups: Squamous type and pustular type. There may be varying degrees of infection between these types, or a combination of the two with some systemic involvement. In the early squamous type, only slight inflammatory changes occur, with the skin dry and scaly, and the absence of hair. Usually these slight lesions appear first around the head and later spread over the body. In the pustular type, the skin is highly reddened with blood and serum oozing from the wounds which also may be infected with bacteria (*Staphylococcus pyogenes albus* or others). Often the whole body is involved in the pustular type, with some systemic and occasionally lymph gland involvement. There are various combinations of the squamous and pustular type with even some atypical forms of the disease found.

Otodectic Mange

Ear mange or otoacariasis is a common ear infection in dogs caused by *Otodectes cynotis* (fig. 5). This mite spends the entire life cycle in the ears undergoing a typical mite development. The ova are deposited in the ear canals and hatch into larvae that develop through the nymphal to the adult stages.

These mites have small, oval bodies with long slender legs all extending beyond the margin of the body, except the third pair of the female's. The first two pairs of the female and all four pairs of the male terminate in bell-shaped suckers. If the ear is examined closely, the small, white, almost transparent bodies may be seen moving about in the crust-filled canals causing great discomfort and uneasiness. The feeding of these myriads of mites cause exudation of serum, then hard crusts form. The dog shakes it head, scratches the ears, and becomes extremely nervous.

Diagnosis

The actual finding of the mite is needed to confirm diagnosis. A scalpel is used to scrape deeply in the affected area until serum appears and then scraping is continued until blood appears. The scraping must be deep to remove sarcoptic mites from the tunnels and demodectic mites from the sebacious glands and hair follicles. Scrape until serum and blood ooze from the surface area. A small amount of the blood, serum, and debris is placed on a microscopic slide with a drop of 10% sodium hydroxide, a cover slip is then pressed down on the material. The slide is examined under the low power of the microscope. *Otodectes cynotis* can be found easiest by using an otoscope to examine the ear canal macroscopically and watch for the moving of the almost transparent small mites. Material swabbed from the ear canals can be placed on a slide on which a drop of sodium hydroxide has been placed to reveal typical mites.

Mange in Cats

There are two species of mites of importance on cats: The sarcoptic type *Notoedres cati*, and *Otodectes cynotis*. Demodectic mange, while reported in literature, is relatively rare. See fig. 6 and 7.

The sarcoptic type species in the cat is smaller and more circular than that in the dog but the life cycle is similar. Lesions in the cat usually appear in the region of the ears, with the tips first affected, and then later spread to the face and head. Severe infections may involve the whole body. Fig. 6.

Feline otodectic mange is common. The cat, to relieve itching, will scratch at the ears and cause abrasions about the head. This often is mistaken for sarcoptic mange because of the scab formation. Examination of an infected ear canal will reveal the myriads of mites,

Fig. 3. Demodex canis, squamous type involving the entire body surface.

which also may be found on the surfaces of the head around the ears. There is an intense pruritus with nervous symptoms, torticollis, and often lesions extending beyond the ears. In some cases lesions have been found on the feet and even tip of the tail from the characteristic habits of the cat in scratching and sleeping.

Treatment

The most important step in the treatment of mange is the preparation of animals. Clipping is important, especially in long haired dogs, since many lesions may be hidden by the long hair. After clipping, a mild soap and water bath will loosen the scabs and clear away the debris so that the acaricide preparations will penetrate to kill the mites. Vigorous and thorough application of the drug is important to reach the mites beneath the surface of the skin.

Many treatments are successful in sarcoptic mange. Lime and sulfur dips or sulfur ointments are excellent but several treatments are necessary before all mites are destroyed. Emulsions of benzyl benzoate and benzene hexachloride give excellent results. Preparations of benzene hexachloride, lindane or chlordane used as dips, sprays or washes, are valuable, usually by one treatment. Care must be used in application since many agents may be toxic if applied in too strong solution or at too frequent intervals.

Cure of demodectic mange is difficult, and even though treatment is started early, results are not always successful. Medications internally have been tried many times but the overall results have not been good. Benzyl benzoate

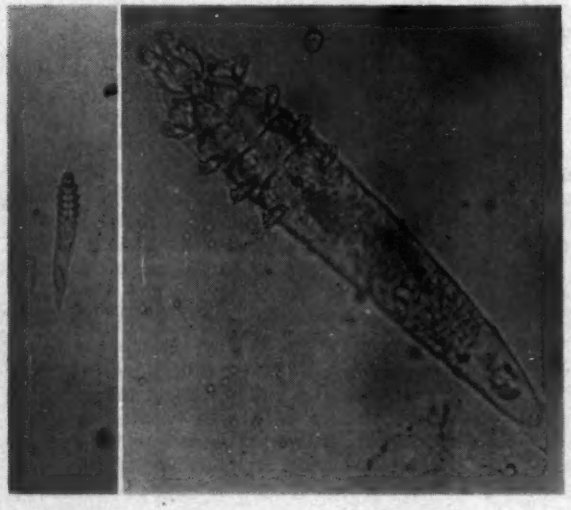


Fig. 4. Demodex canis — Dog. (low power L, high power R)

emulsions or a combination of benzyl benzoate and benzene hexachloride have been used successfully as an external treatment. This drug can be massaged thoroughly into the skin, but not over the entire body at one time. Treatment can be continuous for a ten-day period and then the animal rested before retreatment. We have had success in severe cases by using an emulsion of benzyl benzoate and benzene hexachloride, then resting the dog for several days. After the rest period a bath in seleen®[1] is given. After another rest period a rotenone preparation is used for several days. This alternating treatment gives excellent results if the materials are applied thoroughly. Antibiotics in conjunction with external application of drugs have been successful, especially in the purulent type with systemic involvement.

After Koutz and Rebrassier.
Fig. 5. Otodectes cynotis — dog. Low power.

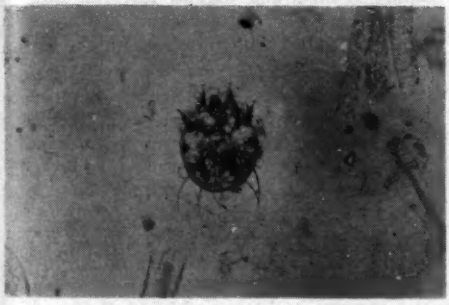
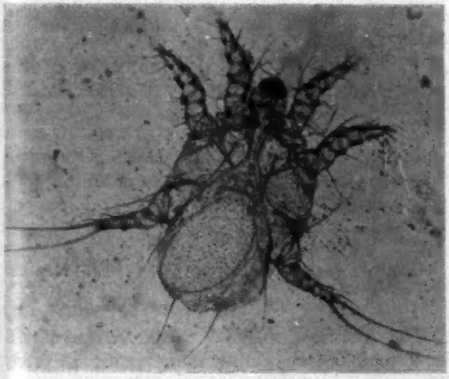


Fig. 6. Notoedres cati — cat. Low power.



After Koutz and Rebrassier.
Fig. 7. Otodectes cynotis — cat. Low power.

In the treatment of otodectic mange, the best results are obtained if the ear canal is cleaned first, then solutions of rotenone used. Canex®[2] has proved most efficacious, a medicine dropper of the material is placed in the ear canal. Some of the drug also should be applied around the ear. If the mites are still alive the second day, more material should be placed in the ear. Bland oils, either mineral oil or olive oil, may be used afterward. The ear is cleaned and treatment repeated in seven days, if indicated.

Chlorinated hydrocarbon preparations are contraindicated in cats. Sulfur ointments or lime and sulfur washes or rotenone preparations give excellent results. It is also well, in treating for ear mange, to place some of the drug employed around the base of the ears, the feet, and also on the tip of the tail.

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Rabies in Wildlife

During the past two years, there has been recorded evidence of increasing incidence of rabies among wild animals in California. Skunks, foxes, and wildcats are those most commonly found infected, according to report of Dr. Ben H. Dean, Public Health Veterinarian, California State Department of Health.

In former years, the major consideration of the rabies problem involved rabid dogs, but in recent years the number of cases identified in wildlife exceeds those in domestic animals. In 1954, there was a total of 83 reported cases of rabies in animals in California. In the first three months of 1955, 73 cases were reported of which 40 were in skunks.

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A 1% aqueous solution of arecoline hydrobromide is used for mass treatment of dogs for echinococcosis in southern countries of South America. The usual dose is 10 ml. of a 1% sweetened solution for large dogs and reduced proportionally for smaller ones.

®[1]Abbott Laboratories, North Chicago, Ill.
®[2]Merck & Co., Rahway, N. J.

American Animal Hospital Association Meeting

Registration at the 22nd annual convention of the American Animal Hospital Association exceeded expectations. All meetings were attended by capacity crowds giving evidence of the interest in "service" to pet owners. A rea-

Dr. W. F. Irwin

sonable portion of this meeting was devoted to matters pertaining to hospital layout, facilities, and service features that influence favorably quality of professional service. Television demonstrations made graphic operations that

Dr. J. H. Yarborough

combined elements of business efficiency with professional handling technics. In addition to these features surgical and *x*-ray demonstrations were televised and discussions on some diseases of current interest were presented from the rostrum.

New officers selected to serve the Association for the coming year included: Dr. William F. Irwin, Tulsa, Oklahoma, president; Dr. James H. Yarborough, Miami, Florida, president-elect; Dr. Joseph T. S. Millar, Deal, New Jersey, vice-president; and Dr. Arthur R. Theabald, treasurer. Dr. Wayne Riser, Skokie, Illinois was reemployed as executive secretary. The meeting for 1956 is scheduled to be held at the newly constructed ocean-front Fontainebleau, which has the finest and most modern facilities for handling sizeable conventions. Tentative dates for this meeting have been set for May 23-27, 1956.

Selected paper presented at this meeting will appear in the Small Animal Section of early issues of VETERINARY MEDICINE.

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The Veterinarian in Public Health

J. D. SALISBURY, D.V.M.

The work of the veterinarian in a department of public health centers around the diseases of animals which are transmissible to man.

The physician is trained to care for human ailments and sometimes calls for help in correlating human and animal diseases, and in outlining steps to protect the health of a group of persons who otherwise might be exposed.

Poliomyelitis was diagnosed in four members of a family which owned a herd of dairy cows. The first inclination was to quarantine the premises to prevent exposure of more people. However, as a veterinarian pointed out, the dairy herd was the primary source of income for the family and to quarantine it was to destroy the income and much of the investment. The desired result, failure to expose more people, could be achieved if the cows could be cared for by a neighbor or an employee having no contact with the human patients.

This is one example of the work of the veterinarian in a department of public health.

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There is evidence of increased interest in veterinary public health as a career among new graduates this spring.

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Cold winters do not prevent worm infections.

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The American Animal Hospital Association now includes an active membership of 281. There are, in addition, 12 past-active and 29 associate members on the roll.

(*Continued from page 266*)

fattening animals. Most of the recent publicity has centered around the feeding of stilbestrol to cattle, but two other products also have been approved. One is a pellet for sheep implantation, and contains estradiol and progesterone. The other is an oral product (dienestrol) which was approved some years ago for use in poultry feed.

Stilbestrol has captured the imagination, because it has increased the rate of gain markedly, and also has improved the efficiency of feed conversion; that is, reduced the pounds of feed required to produce 100 pounds of beef.

The subject of hormone feeding is not really new. For a number of years it has been known that certain legumes (especially Subterranean clover in Australia and New Zealand) and other forage crops, contain appreciable quantities of the female sex hormones. In the United States, certain crops, and especially the legume silages, have been known to contain enough female sex hormone to produce cystic ovaries in a high percentage of dairy cows in a herd. These have been reported in various publications.

Q. What will happen if steer supplements are fed to breeding animals?

Andrews. Definite information is not complete on this subject, but we know that heifers and cows will develop cystic ovaries and other undesirable complications of the reproductive cycle. It is recommended, therefore, that stilbestrol feeding be restricted to fattening animals.

Q. What will happen to pigs following cattle fed on stilbestrol?

Andrews. Again, the answers are not complete. We do know, however, that much stilbestrol is present in the feces and urine of the steers to which it is fed. We also know that when stilbestrol is fed experimentally to pigs, the gilts look as though they are in heat all the time, and the barrows develop enough mammary tissue to pass for sows in advanced pregnancy.

The development of these conditions in pigs following cattle will vary, but if continued throughout the fattening period, some of these changes should be expected. Some unfavorable reports have been received and one report says that five sows have aborted in one herd so managed. Whether the hormone can be implicated in the abortions remains to be determined.

Tests are now in progress at several experiment stations to obtain answers to many of these questions.

Q. Will hormone residues remain in the muscle and other edible parts of the carcass, and what effect will they have on human beings?

Andrews. This problem was studied carefully by the Food and Drug Administration before permitting the feeding of stilbestrol. The conclusion was that the amount present was so small that it was difficult to find, and that the amount of meat or liver consumed by even a heavy meat eater would contain so little of the hormone that it could have no noticeable effect.

Mastitis

Q. How should gangrenous mastitis be handled?

Westcott. My first step is to amputate the teat on the infected quarter and make several radical incisions from top to bottom. The infection present probably is anaerobic and the first problem is to admit oxygen. The next is to drain the pus and treat the condition as a series of open wounds. The quarter is lost for milk production, and the remaining problem is to save the life of the cow.

Glucose solution (12½ %) is injected intravenously when toxemia is present. Antihistimine is added to the glucose treatment when indicated.

Penicillin and other antibiotics, the sulfonamides, and other medicinal agents are sometimes helpful, but gangrenous mastitis has responded to my treatment only when the toxicity is first controlled as indicated.

Q. What effect may bovine mastitis have on human health?

Salisbury. Staphylococcic mastitis has been known to result in milk containing toxins, and in one instance, at least, the drinking of such milk resulted in death of a child. In general, this is a localized, individual problem, and not one which involves the public health.

Q. After a quarter has been treated with antibiotic, is public health a question for consideration in the marketing of milk from such a quarter?

Salisbury. It is recommended that milk from a treated quarter be withheld from the market supply for 48 to 72 hours. If this recommenda-

tion is followed, there is little danger of human sensitization.

The effect of drinking milk from treated quarters, and still containing appreciable amounts of antibiotic is not known. We do know that it can interfere with the cheese-making cultures, and human sensitization has been suggested but not demonstrated.

Q. Why not use anterior pituitary extract, instead of posterior for stimulating milk let-down?

Westcott. The milk let-down hormone, oxytocin, is secreted by the posterior lobe of the pituitary gland. I have used it successfully. Anterior pituitary extract has not been used in our practice, but I would welcome information on it.

From the floor. Anterior pituitary extract has been used by the older practitioners for more than 20 years in cows that are toxic and holding up the milk. Within five to seven minutes, the milk will be available and the udder can be emptied completely.

Andrews. A number of years ago, extracts of the pituitary gland contained fractions from the anterior as well as the posterior lobe of the gland. These doubtless carried oxytocin with other factors. Oxytocin produces a marked contraction of smooth muscle and thus contributes to rapid milking. Other factors may be washing or massaging the udder, the rattle of milk pails and cans, the rolling of a feed cart, or a radio program.

Acetonemia or Ketosis

Q. Is it desirable to give 500 cc. of normal saline solution along with 500 cc. of glucose solution in acetonemia?

Craige. No advantage is gained by so doing. The glucose or dextrose does the job and volume is not a factor.

Q. Should a heart stimulant be mixed with the dextrose solution for intravenous injection?

Craige. No, I believe the stimulant should be injected first, so that heart action is good when glucose injection begins. The purpose of heart stimulation is to strengthen contraction of the muscle and insure emptying the heart and thus maintaining the normal circulation of all the blood.

Calcium deficiency results in reduced activity, because calcium is the normal regulator of the tone of smooth muscle throughout the body. To inject extra fluid before heart action is strong may aggravate the problem, and simultaneous injection of fluid and stimulant is less effective than heart stimulation in advance of fluid injection.

Q. How important is rumen function in the prevention of ketosis?

Westcott. Very important, in my opinion. Although the true cause of ketosis has not been established definitely, the imbalance of carbohydrate and fat metabolism is known to be involved, and normal rumen function is necessary to proper metabolism. Therefore, enhancement of rumen activity is indicated in acetonemia.

We use a product called profloran®[1]. It is not a cure-all, but a definite help in many cases.

Conner. Cobalt has been used in parts of Michigan with beneficial results on rumen function and has improved metabolism and general condition in ketosis cases.

Q. Does sodium propionate or acetate have a place in ketosis prevention?

Craige. Yes. While working in Maryland, we found that propionate is a precursor of glucose. Propionate is absorbed from the rumen and carried to the liver where it is converted to glucose or glycogen. Then it serves the same as dextrose injected intravenously. When the sodium salt is used, excessive alkalinity may sometimes result and be detrimental.

Glycerine and propylene glycol react in the same way as dextrose, also, since they are metabolized as is the propionate fraction.

Q. What about stress as a factor in ketosis?

Andrews. The stress phenomenon has been publicized widely in recent months. As generally used, stress is any unusual or exhausting or debilitating condition. Therefore, acetonemia certainly classifies, but so does every other disease, imbalance, or ailment.

Stress often applies to those conditions for which no infectious agent can be found, and in which endocrine imbalance is a prominent manifestation. Again, many variables are covered. In effect, the treatments just discussed are designed to reduce or eliminate or hide the symptoms of stress until the animal body can make the adjustments necessary to normal metabolism.

Q. If a client had a cow with milk fever,

(Continued on page 288)

[1] Jensen-Salsbery Laboratories, Inc., Kansas City, Mo.

Clinical Evaluation of a New Systemic Hemostatic Agent

C. W. CROMLEY, D.V.M., Ashville, Ohio

A rapid acting, dependably effective, completely safe, and economical systemic hemostatic agent is a valuable, therapeutic tool. A new agent, klot®, has been subjected to clinical trials for a period of over six months. Evaluation of its efficacy in a large number of applications to both large and small animal practice is reported. This drug is unique in that it attacks the problem of hemorrhage by local tissue effect at the point of trauma or surgical incision and, also, accelerates clotting time simultaneously. In our hands it has been effective and free from side action or toxic effect when used in a wide variety of species and clinical conditions.

Results of Clinical Use

Cesarean Section in Cattle, Sheep, and Swine. Klot was used routinely to control hemorrhage in these surgical procedures. Since the problem of hemorrhage is reduced, surgery can be completed with a minimum of tissue damage and exposure of the abdominal cavity. Twenty-one cases have been operated successfully. All made uneventful recoveries. No toxic effect of the hemostatic agent employed was noted on patients or offspring.

Hematomas in Cattle. In the treatment of hematomas in cattle, klot was used at the rate of approximately 40 cc. intravenously for the average size cow. The purpose was to control seepage hemorrhage back into the lesion after surgical drainage. In 25 cases treated, hemorrhage subsided within a few minutes after the new hemostatic agent was injected. No further problem developed in the treatment of these cases.

Damaged Horns in Cattle. Successful control of hemorrhage in damaged sinus and in the body of the horn in nine cases was attributed to injection of klot.

Bloody Milk. This troublesome condition responded to injection of 40 cc. of klot intravenously in the average cow. If infection (mastitis) is present, the gland was treated in the usual manner. Hemorrhage in 25 cases of bloody milk was controlled promptly in contrast to some previous experience in treatment of these cases.

Surgical Procedures in Small Animals. Klot was given preoperatively in 105 cases at the rate of 1 cc. per 10 lb. of body weight. These were unselected, routine small animal surgical cases. In every application, hemorrhage was controlled effectively. No interference with anesthesia or other drugs was noted at any time.

In accident cases of small animals, klot was administered routinely immediately to control internal bleeding. Its use before the appearance of symptoms constitutes excellent preventive medicine. In one case of accidental amputation in a dog (one foot and the toes of another foot cut off by a mowing machine) the new agent, given intravenously, was effective as the sole effort to control hemorrhage. Bleeding was stopped quickly and recovery was uneventful.

In my single case which did not respond an interesting association is noted. A blue tick coon dog was presented suffering acute tonsillitis. After ten days of high level antibiotic and sulfonamide therapy, acute infection was arrested. The tonsils were removed surgically by electric cautery and klot infiltrated into the tonsil pits, using a quantity of 1.5 cc. at each location. An additional 3.5 cc. was given intravenously. Although bleeding was scanty, it was continuous and could not be controlled with additional drug or physical treatment. The animal died in 12 hours. Since the response was non-typical, I am inclined to believe that the hemorrhage may have been due to the prolonged high level antibiotic and sulfonamide therapy.

The new hemostatic agent under clinical trials has been used in a wide variety of surgical procedures both parenterally, as a systemic drug, and by infiltration at the point of hemorrhage. In 12 cases operated for corns between the toes of cows and bulls, it proved effective in controlling hemorrhage. Another example is its use prior to surgical correction and entropic eyelids of lambs. The drug infiltrated under the skin, at the site of surgery, effectively controlled excessive hemorrhage. It also served a useful purpose in the surgical removal of tumors from the skin and the mammary glands.

Conclusion

Klot was found to be a rapidly effective drug for the control of hemorrhage in large and small animals of all common species. Its use was not accompanied by detectable toxicity of any type, and it did not interfere with

®The Warren-Teed Products Company, Columbus, Ohio.

the use or action of other drugs. It appears to have a wide range of application in all types of veterinary medicine, many of which have not been covered in this report. Its use is considered economical, feasible, and practical. It may be administered by any route without local irritation or toxicity, and is speedily effective when given parenterally.

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Drug Action in Veterinary Medicine

(*Continued from page 258*)

moved from the blood just as rapidly as smaller ones. The optimal dose should be approximately 0.5 cc. per lb. body weight of a 23% calcium gluconate or its equivalent. Thus the dose should vary with the size of the cow. But doses much larger than this, based upon body weight, in most cases will do no more good, and can be dangerous.

The cause of milk fever may be attributed to an inherent "hypocalcemic tendency" which so far has not been identified clearly, but is known to occur most frequently at parturition. When it occurs, the cow may die from the secondary effects exerted by low calcium on blood circulation and other functions. Injections of calcium work by raising blood calcium, thereby forestalling the secondary effects, and averting the crisis. Thus calcium simply keeps the cow alive until she adjusts to the needs, and thereby overcomes the hypocalcemic tendency.

How long this requires is another question. Some cases relapse two, three, or even four times. These are examples of persistent hypocalcemic tendency. Others adjust in a couple of hours. It is never possible to tell beforehand how long the cow will require supplementary calcium, although predictions sometimes can be made from past history. The case of uncomplicated, but persistent, hypocalcemia should be distinguished from the cow that fails to respond because of heart damage, nerve injury, a penetrating nail, or other complications. The former gets up and appears normal after each dose of calcium, only to go down again later. The complicated case never responds properly, and should be searched for the cause, as soon as it is evident that there is no response to calcium.

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Over 3,500 different antibiotic substances have been isolated and studied during the past 12 years.

Swine Encephalitis

(*Continued from page 255*)

speculation but still is not established. It is not due to contaminated or faulty products. Many workers have suggested that the encephalitis is caused by some unrelated entity which has been present in the individual in a latent state and has been activated by the vaccination or the infection. However, no one ever has been able to identify this entity up to the present time.

The clinical manifestation produced by parasites, food and mineral intoxication, certain nutritional deficiencies, and bacterial and virus infections of the central nervous system are quite similar, especially during the later stages when the animal develops convulsions.

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There is some degree of potential danger of anaphylaxis following injection of gonadotropic hormone, which is protein in nature and frequently referred to as a proteohormone. Undesirable effects generally may be controlled readily by prompt parenteral administration of epinephrine.—*F. N. Andrews, Ph. D.*

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Behavior does not characterize ovarian cysts in hogs as observed in cattle.

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Service to the Poultryman

(*Continued from page 264*)

plement as much as possible. Give no sulfonamides. Take out all growth stimulants temporarily, heavy antibiotics, nitrophenides and arsanilates. Add ¼ lb. methadione per 500 lb. of feed plus complete vitamin supplement and use for ten days.

Erysipelas in Turkeys. This is another spectacular disease. Swollen snudes may or may not be seen. Sudden deaths and considerable lameness are observed most consistently. Postmortem examinations may be almost negative or one may find only an enlarged spleen.

Education of ourselves is a challenge which, if accepted, may make possible an enjoyable and profitable poultry practice. Considering the availability of so-called poultry experts and the numerous agencies in the business of sales to poultrymen, we are encouraged to emphasize the value of qualified professional service to the poultry industry.

EDITORIAL COMMENTS

The Nation's Food Supply

How science has contributed to an abundant food supply enjoyed by Americans today is subject of a special report (*Newsweek*, Apr. 25, 1955) by Science Editor Richard K. Winslow.

Few aside from those closely associated with food producing efforts realize the tremendous contributions of those trained for research. Within the generation "test-tube farmers" or "college scientists" were held in rather general disdain by the "dirt" farmer, or actual producer of food. Changing times are evident in the promptness with which alert feeders and growers now accept findings of investigators and put them to crucial field test.

The author refers to multiple problems producers will face in the effort to maintain present per capita volume and quality of food for a growing population. In the light of statistics, present surpluses of a few commodities appear insignificant. More and more food, not less, must be produced. Increased supply must come from better or more scientific methods than even the best today. A shrinking rural and expanding urban population also emphasizes this need.

To illustrate the "revolution at the dinner table", there is included a statistical table that graphically illustrates startling shifts in the American appetite and agricultural methods, and the dependence of larger and larger numbers of people on fewer producers for more food. Per capita consumption of beef has increased from 59 lb. in 1925 to 72 lb. in 1955 and of chicken from 14 lb. to 23 lb. A farm worker who produced food for eight people in 1925 must produce sufficient for 19 persons this year. That during this period the average size of farms has increased from 141.9 to 215.6 acres and the farm population reduced from 31,200,000 to 21,000,000 are a few of points mentioned.

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The problem of serving 7,500,000 more meals each year is a pressing one. Improved efficiency in production, processing, marketing and conservation is essential. Not the least of efforts is conservation of meat food producing animals by control of diseases that cut short maximum production from every unit.

When to Call Your Veterinarian

Dr. A. C. Todd, Veterinary Parasitologist, University of Wisconsin, Madison, answered a question posed in the current issue of *Livestock Conservation News* suggesting that veterinary service be utilized for parasite control. He stated, "A veterinarian should be called before any worm parasite control system is adopted by each farmer. The veterinarian's knowledge and skill should be utilized to tailor-make a worm parasite control system specifically for each farmer's particular method of production. Farmers can be criticized for using their veterinarian only to 'put out fires'. Our most successful farmers and our most successful veterinarians are those men who prevent disease instead of curing it after its appearance."

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The average physician who works 60 hours a week, spends about 10 hours a week keeping up with developments in his field, stated *Science News Letter* for April 23, 1955.

Medical science, both human and veterinary, is advancing so rapidly that such time is required if a practitioner continues to give the service clients expect. A recent evening program presented by faculty members of the School of Veterinary Medicine, Kansas State College, Manhattan at the April meeting of the Kansas City Veterinary Medical Association demonstrated spectacular advancements in veterinary science and the methods of its presentation. It also emphasized the essential need for practitioners to devote some regular time to current problems through means available existing in periodic, professional literature, association programs, and short courses sponsored by colleges. One also learns by association with those he meets on such occasions.

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Belief in Medicine

In 1950, there were used in the United States 138,000,000,000,000 units of penicillin; by 1952 this had increased to 360,000,000,000,000 units. It is estimated that the American public suffered 500,000,000 headaches in 1954. To combat these there was consumed 18 tons of aspirin daily with many additional tons of proprietary headache powders. *Bul. Med. Res.*, Mar.-Apr., '55.

Stilbestrol News

The only consistent item about stilbestrol is the continuing controversy between those recommending hormone feeding and those who purchase the animals for slaughter.

Some rumors were circulated recently that packers were discounting stilbestrol-fed animals when they could spot them. Buyers can pick these cattle and are concerned about yield, carcass grade, and shrink. By the time 2,000,000 plus cattle in feed lots are marketed, some practical answers that now concern packers should be answered.

Variable results in the feed lots and in the coolers largely reflect quality of basic rations. This is to be expected when the diversity of supplemented rations is considered. Liveweight shrink varies from lot to market depending on nutrient quality of the ration and also on stilbestrol supplementation. Increased gains are of no value unless protein quantity and quality stay with the carcass during processing and provide more and better protein food per unit of rations consumed by the animal.

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Automobile Accident Toll

While 1954 saw a slight decrease in the nation's automobile accident toll, nearly two million casualties were recorded. Even with the slight improvement over the more than two million reported in 1953, the results are staggering.

The Travelers Insurance Companies of Hartford, Conn. report 35,500 persons killed and 1,960,000 injured in 1954. Excessive speed was the most dangerous driving mistake in 1954. Speed killed 12,380 people and injured more than 659,000.

Weekend crashes accounted for 13,980 killed and 678,000 hurt during 1954. Thirty-nine per cent of the deaths and 35% of the injuries occurred on Saturdays and Sundays last year. Three out of four auto accidents happened to passenger cars driving in clear weather on dry roads, and 78% of vehicles involved in fatal accidents were traveling straight ahead.

These are grim statistics. The above figures point out that accidents are heavy, even though state and community authorities have spent millions of dollars in an effort to provide safer and better roads and saner driving.

Insurance companies and other private firms are spending millions for safety education. State, county, local, and parkway police are constantly patrolling streets and highways. More and better engineered thruways are coming off the drawing boards. It appears that almost everyone is concerned with this needless slaughter and its accompanying waste of human and property values. Almost everyone, that is, but the drivers.

Traffic regulations were set up as a proper guide for the handling of traffic, and need cooperation of all drivers. The problem starts and could ideally end with the drivers. Who are the drivers?

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Variation in Pork Quality

Variation in nourishment quality of pork products was subject of a report by Prof. Ray L. Shirley, University of Florida, Gainesville, scientist before the recent meeting of the American Chemical Society.

Chemical analyses reveal differences in protein elements of edible tissue samples. This varies according to the dietary regimen. Pork having the highest protein value came from caracasses of hogs fed best protein supplements in adequate quantities. Antibiotics had little effect except where protein levels in feed were limited.

Specific chemical influence of rations has been a neglected aspect of nutritional studies. Nourishment values of meat are of significant importance in evaluations of a ration and should be considered along with observations of growth rates, carcass quality, and animal vigor.

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Symposium on Cattle Practice

(*Continued from page 284*)

and three or four relapses occurred following several treatments during the recovery period, would you advise sale of the cow before next calving, or can milk fever be prevented by a feeding program?

Craige. The only way to get rid of milk fever is to get rid of the cows that have it. Some individuals have a tendency to develop milk fever, and this tendency is inherited and transmitted. Breeders do not like to follow this plan of culling, because heavy milk production is frequent in the cows that develop milk fever. This is not always true, however, because some cows will develop milk fever on low production, and certainly not all high-producing cows develop milk fever.

A.V.M.A. — 92nd Annual Convention—Minneapolis, Minnesota August 15-18, 1955

Minnesota, land of 10,000 lakes, is unique in that the most remote parts of the north country are separated by only a few hours' travel from its metropolitan centers. Minnesota's water (over 2,000,000 acres of it) and wilderness areas have attracted sportsmen and vacationers for years. Climate in August is pleasant, combining warm days and cool nights, ideal for camping, motoring, or just plain loafing. Convention visitors are encouraged to combine attendance at this meeting with a family vacation. A visit in upper Minnesota is certain to be a restful and rewarding experience.

Program details are now being prepared for publication and will appear in six sections: General Practice, Small Animal Practice, Surgery and Obstetrics, Research, Poultry Practice, and Public Health. The July issue of the *Journal* will carry the complete program and names of participants.

Again this year, closed-circuit television demonstrations will be presented through the courtesy of the Allied Laboratories, Inc., and Radio Corporation of America. This will be the fifth consecutive year these companies have collaborated in making this media available which has added so much to the education value and interest in scientific presentations.

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Hydatid Cysts in Chinchilla

Hydatid disease is not uncommon in chinchilla and may be mistaken for tumors. Their location may be anywhere in the affected animal's body, subcutaneous tissue or vital organs. Hydatid is the immature or cystic form of *Echinococcus granulosis* tapeworm. Dogs, wolves, or other predatory animals may be infected with the adult worm. Cysts occur on ingestion of infective eggs passed with feces of infected host animals. Man and a number of herbivorous animals are susceptible to hydatid disease.

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Phenothiazine is effective against more kinds of parasites in more kinds of livestock than is any other anthelmintic.—*D. C. Boughton, D.V.M.*

Skyline of Minneapolis, metropolis of the north Midwest, from the east bank of the Mississippi River. Prominent building on the west bank of the river is the U. S. Post Office. Nicollet Island (foreground) was named for the Frenchman Joseph Nicholas Nicollet who explored the basins of the Red, Arkansas, and Missouri Rivers and the sources of the Mississippi.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Rabies Vaccination

Since veterinarians frequently are asked for advice when a human being has been exposed to rabies infection, it is not out of place in this column to indicate good management practices as gleaned from current literature. First of all, the exposed person should seek the services of a physician. Frequently it is difficult to get an exact history, especially from children. It is still a practice to apply local treatment to a comparatively recently inflicted bite or other wound though those severe remedies such as cauterization with fuming nitric acid now are considered unnecessarily severe; flushing the wound with a strong soap solution followed by swabbing with a 1% cationic detergent is considered effective. When the history is incomplete, and when the evidence in regard to the biting animal is suggestive of rabies, an injection of hyperimmune serum should be given at once as it will make antibodies available to the exposed person immediately. It also will give protection for a week to ten days. However, if there is a positive record of rabies infection it should be followed, one day after the administration of serum if necessary, by a chick-embryo vaccine, or, if this is not available, a rabbit-brain vaccine may be used. Possibility of a neuroparalytic reaction which has been followed in some instances by a fatal termination emphasizes the selection of the former type of vaccine both for safety and efficacy. Veterinarians are responsible for seeing to it that the biting animal is kept confined for at least 14 days so that latent infections become clinically recognizable.

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Arthritis Vaccine

Good results are reported in Europe in the treatment of arthritis in swine by means of formalin-killed, aluminum-absorbed, swine erysipelas vaccine. Some of the recorded cases that had failed to respond to penicillin, salicylates, et cetera were relieved by the use of the vaccine. The treatment is based on the clinical assumption that arthritis is due to joint invasion by *Erysipelothrix rhusiopathiae*.

Retreat for Hog Lice

Dipping hogs in approved lindane or benzene hexachloride dips is effective in killing the lice but not all nits, so that infestation may be observed 18 to 30 days following dipping. A federal research report indicates that fewer nits survive the dip when emulsion concentrates of lindane or BHC are used than when suspensions of wettable powders of these agents are employed. It is even reported the percentage of nits obtained from hogs dipped in wettable powder suspensions is nearly the same as that of nits obtained from animals before being dipped.

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Mechanical Abortifacient

A method of inducing intended early abortion of maiden heifers is reported by Roy and Rowson of India in the March 5, 1955 issue of *The Veterinary Record* (British). The method, an unusually unique one, consists of the insertion of a spring into the cervical canal. The introduction is by means of a special instrument so the angle of the spring is in the uterus and the two free ends, which separate by tension when released by the instrument, are attached mechanically to the walls of the vagina. The result is that the cervix remains patent. In a high percentage of the experimental animals the heifers settled to service, and pregnancy terminated early in the gestation period. Autopsies failed to disclose evidence of pathological changes in the cervical canal as a sequence of the implantation of the spring. The entire problem in India, as explained by the authors, is that gradual reduction in the numbers of cattle is desirable because of limited feed supplies. Mechanization, a slow process in India, has not supplanted cattle for draft purposes nor are these beasts likely to be replaced in the foreseeable future.

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Now that frozen semen is being used more extensively in artificial insemination of cattle, it is well to remember that *Vibrio fetus* survives in deep-frozen semen.

The Physiology of Domestic Animals

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Rabbits

The Rabbit as an Experimental Animal is discussed by Paul B. Sawin* of the Roscoe B. Jackson Memorial Laboratory. The rabbit long has been regarded as an important animal for immunological and serological investigations and in the investigation of mammary development. Because the doe ovulates only after copulation, she is particularly adaptable for the Friedman test for pregnancy.

Of course, the rabbit is also a popular children's pet and a meat food animal. It is so well known that it suffices to say here that the gestation period ranges from 28 to 36 days with an average of 31 days; the young are weaned at six to eight weeks of age, preferably the former; the doe should not produce more than four litters per year; it is best to keep the sexes separate, and mating is more easily achieved when the doe is taken to the buck rather than the converse.

Inbreeding is regarded as hazardous, presumably because of the long period during which the domestic rabbit has been outbred. However, at the author's laboratory there are six races that "have been inbred (linebred) parent to offspring for 10 to 20 generations."

The author stresses sanitation above everything else in maintaining the health of the colony — daily cleaning, washing, boiling, and disinfection of equipment. However, many years before deep litter was even thought of for poultry, some rabbit raisers were employing this principle in rabbit raising with success as a preventive of coccidiosis, snuffles, and some other infections. The objection to a system of once-a-year or twice-a-year cleaning of hutches in a laboratory is understandable, but for esthetic not sanitary reasons, as the author maintains.

The infectious diseases and other ailments discussed by the author include: Ear canker due to mites, mange due to mites, ringworm due to fungi, sore hocks due to bruising or chafing followed by infection, urine burn, vent disease, conjunctivitis, scabby lips, mastitis, snuffles, pneumonia, buck teeth, hepatic coccidiosis, intestinal coccidiosis, mucoid enteritis, tapeworms, paralysis, and wry neck. Rather definite directions for treatment are given for each of the foregoing, all amenable to therapy, which suggest the question: If the author's elaborate system of sanitation is anywhere near as efficacious as he credits it with being, how did he learn so much about the infectious diseases of rabbits?

*The Care and Breeding of Laboratory Animals, edited by Edmond J. Farris, John Wiley & Sons, Inc., New York, N. Y.